AD-776 973

ENLISTMENT MOTIVATION AND THE
DISPOSITION OF ARMY APPLICANTS

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Human Resources Research Organization
Alexandria, Virginia

March 1974

AD-776 973

REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER HumRRO-TR-74-5	**2. GOVT ACCESSION NO.**	**3. RECIPIENT'S CATALOG NUMBER**
4. TITLE (and Subtitle) ENLISTMENT MOTIVATION AND THE DISPOSITION OF ARMY APPLICANTS	**5. TYPE OF REPORT & PERIOD COVERED** Technical Report
	6. PERFORMING ORG. REPORT NUMBER HumRRO-TR-74-5
7. AUTHOR(S) Allan H. Fisher, Jr. and Margi R. Harford	**8. CONTRACT OR GRANT NUMBER(S)** DAHC 19-73-C-0004
9. PERFORMING ORGANIZATION NAME AND ADDRESS Human Resources Research Organization (HumRRO) 300 North Washington Street Alexandria, Virginia 22314	**10. PROGRAM ELEMENT PROJECT TASK AREA & WORK UNIT NUMBERS** 62107A; 20062107A745 Task Area 00; Work Unit 719
11. CONTROLLING OFFICE NAME AND ADDRESS Office of the Chief of Research and Development Department of the Army Washington, D.C. 20310	**12. REPORT DATE** March 1974
	13. NUMBER OF PAGES 82
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)	**15. SECURITY CLASS. (of this report)** Unclassified
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

Work Unit RECRUIT III; Research Performed by HumRRO Division No. 7 (Social Science) Alexandria, Virginia.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Armed Services	Factor Analysis
Assignment	Motivation
Career Development	Recruiting
Enlistment	Training 0509/0510

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Research was performed to (a) classify reasons for Army enlistment, and (b) identify factors associated with enlistment in the Army or another Service. Data from two samples of FY72 Army enlistees were subjected to factor analysis and hierarchical cluster analysis techniques to generate a four-way classification of reasons for enlistment: (a) vocational development, (b) enlistment in the Service of one's choice (Army) at the time of

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one's choice, (c) individual development and change, and (d) military per-
sonnel benefits, including the G.I. Bill. Automatic interaction detection
and multiple regression techniques were applied to other FY72 data to identify
factors associated with the disposition of initial Army applicants. The two
factors most influential were educational level and race. Factors associated
with the disposition of initial applicants to the Navy, Air Force, and Marine
Corps were also identified.

Enlistment Motivation and the Disposition of Army Applicants

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HUMAN RESOURCES RESEARCH ORGANIZATION

Work Unit: RECRUIT-ENLIST   March 1974

Prepared for

Office of the Chief of Research and Development
Department of the Army
Washington, D.C. 20310

The Human Resources Research Organization (HumRRO) is a nonprofit corporation established in 1969 to conduct research in the field of training and education. It is a continuation of The George Washington University Human Resources Research Office. HumRRO's general purpose is to improve human performance, particularly in organizational settings, through behavioral and social science research, development, and consultation. HumRRO's mission in work performed under Contract DAHC 19-73-C-0004 with the Department of the Army is to conduct research in the fields of training, motivation, and leadership.

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FOREWORD

This report describes activities performed by the Human Resources Research Organization under Work Unit RECRUIT/ENLIST, a project conducted for the U.S. Army Research Office of the Department of the Army. The principal objectives of the study were (a) to determine the structure of reasons that lead to the enlistment decision, and (b) to isolate factors that lead some initial Army applicants to enlist in one of the other Services instead of the Army.

This study involved the analysis and interpretation of data from an existing survey base—data from a sample of FY72 enlisted accessions, that had been collected for the Department of Defense at regular intervals at selected Armed Forces Entrance and Examination Stations (AFEES). Multivariate statistical analyses were performed on the data.

The research was performed by HumRRO Division No. 7 (Social Science), Alexandria, Virginia. Dr. Arthur J. Hoehn was Director of this Division at the time; Dr. Robert G. Smith, Jr. is currently Director. Dr. Allan H. Fisher, Jr. was the Work Unit Leader and formulated the research problems. Data analyses were designed and executed by Dr. Joel M. Reaser. The literature review and research assistance activities were performed by Ms. Margi A. Harford and Mr. John A. Richards.

Special acknowledgement is due to BG Harold D. Yow and LTC Joe R. Dickerson of the U.S. Army Recruiting Command (USAREC) Guidance in substantive aspects of the research design was provided by CPT Donald R. Carfagna and SPEC/5 Donald Lombardi (USAREC). The technical monitor for the project was Jacob L. Barber, Jr., Army Research Office (ARO).

HumRRO research for the Department of the Army under Work Unit RECRUIT was performed under Army Contract DAHC 19-73-C-0004. Army Training Research is conducted under Army Project 2Q062107A745.

Meredith P. Crawford
President
Human Resources Research Organization

PROBLEM

In an all-volunteer military force environment, increased competition for qualified individuals makes it necessary to develop optimal strategies for advertising and recruitment. In particular, it is essential to design and package reasons for enlistment that will attract each segment of the target audience. As a second aspect of an optimal recruitment effort, it is desirable to identify demographic characteristics and other factors that may influence the ultimate branch-of-Service decision of youth who apply to the various Armed Services for enlistment.

RESEARCH OBJECTIVES

There are two major objectives of this research:
  (1) To identify the classification of reasons given for enlisting in the Army.
  (2) To identify factors (positive and negative) that are involved in enlistment into the Army or in the selection of another Service.

The scope of the research encompasses the requirement to perform analyses on existing survey information as reported by Army enlistees, in order to obtain a more extensive and sophisticated understanding of their motives for enlistment. Additional requirements involve analyses of the implications of the advertising and recruiting strategies of the Armed Services, as determined from existing enlistee survey data, and a comparison of Army recruiting strategies and experience with that of the other Services.

RESEARCH APPROACH

Items analyzed included sample survey data on the importance of 12 reasons for enlisting, the service first contacted while considering military service, the service in which the individual eventually enlisted, and selected demographic data.

For the first research objective, multivariate statistical analyses (factor analysis, hierarchical cluster analysis) were used to classify the 12 reasons for enlistment for the samples of FY72 Army enlistees. For the second objective, other techniques (multiple regression, automatic interaction detection) were applied to data from samples of FY72 enlistees to each Service obtained at Armed Forces Entrance and Examination Stations (AFEES). These analyses were done to identify the factors most highly associated with a potential recruit's ultimate enlistment in the Army versus enlistment in another Service. A review of the literature was performed in support of the two major research activities.

Research was performed in a "draft environment," therefore the findings with respect to factors affecting selections of service may not be wholly applicable in the draft-free environment of an All Volunteer Armed Force.

RESULTS

Review of the literature from 1949 to 1972 showed that the most frequently endorsed reason for enlistment was the opportunity for advanced education and training. For Army enlistees in FY72, the most frequently endorsed reasons were the acquisition of a trade or skill that would be valuable in civilian life and the opportunity for advanced education and training.

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Classification of Reasons for Enlistment

The four-way classification of reasons for enlistment, which was generated using the factor analysis and hierarchical cluster analysis techniques, included:

    (1) Enlistment for vocational development (civilian or military skills), with the emphasis on opportunities for advanced education and training and the acquisition of a trade or skill.

    (2) Enlistment in the Service of one's choice (Army) and at the time of one's choice.

    (3) Enlistment for individual development and change, with the emphasis on increased maturity and self-reliance obtained by exposure to travel, excitement, and new experiences.

    (4) Enlistment to obtain military personnel benefits (including pay) and to qualify for the G.I. Bill.

Clusters 1 and 3 represent some form of developmental motivation on the part of the Army enlistee. The two clusters overlap slightly, but they are sufficiently independent to make it important to distinguish between them. Endorsement of the reasons in Cluster 1 represents enlistment to learn or develop a job skill, while Cluster 3 represents enlistment for development as a person. Cluster 2 suggests that some recruits prefer the convenience of enlisting when they want to, as opposed to a delayed enlistment—this is, in part, a function of draft-motivated enlistment. The first three clusters include the reasons for enlistment most frequently endorsed as strong influences in enlistment by Army enlistees. Cluster 4 includes enlistment to obtain the benefits of the G.I. Bill and other personnel benefits such as pay and medical care.

The same general classification was found in applying each statistical technique to data for Army enlistees in both the first half of FY72 and the second half of FY72.

Identification of Factors Affecting Selection of Service

Analyses using linear multiple regression and the automatic interaction detection (AID) techniques yielded similar results in terms of factors identified as operative in the disposition of initial applicants for enlistment.

For initial applicants to the Army who subsequently enlisted in either the Army or another Service, the major factors influencing Army enlistment were educational level and race. The Army was more likely to enlist applicants who were high school graduates (or above) and to enlist White applicants. An interaction effect was found in which White high school graduates were more likely to be enlisted into the Army (94%) than were non-White non-high school graduates (82%).

Analyses of the disposition of initial applicants to the other Services showed that the major factor operative for Navy enlistment was educational level. Aptitude (AFQT) and age were the most important factors in the disposition of initial applicants to the Marine Corps or to the Air Force. An interaction of age and aptitude (AFQT) also was noted in the disposition of initial applicants to the Air Force and to the Marine corps. Race was also a factor in the disposition of Air Force applicants.

Qualified Army applicants who were lost to the other Services tended to be older and tended to have had formal training in a trade school. In general, they endorsed the opportunity for advanced education and training as a strong influence in enlistment at a higher rate than did Army applicants who were successfully enlisted into the Army.

Additional analyses indicated that the Army acquired a larger number of enlistees from the pool of initial applicants to the other Armed Services ("gains"), relative to the quantity of initial Army applicants lost or rejected by the Army but subsequently enlisted by one of the other Services. The relative quality (education, aptitude) of "gains" also was found to be superior to the quality of Army applicant "losses."

However, the quality (education, aptitude) of *initial Army applicants* was *far superior* to the quality of "gains" from the pool of initial applicants to the other Services.

CONCLUSIONS

(1) The analyses suggest that the major emphasis in Army advertising should be in the areas of training and educational opportunities. One or more of the four major clusters of specific reasons for enlistment could be used as a base for independent advertising appeals designed to motivate young men to enlist in the Army.

(2) Emphasis on the opportunity for advanced education and training might be used by the Army both to improve the rate of enlistment of qualified Army applicants now lost to the other Services, and to attract men who were initial applicants to one of the other Services.

(3) Because the quality of initial Army applicants is superior to the quality of "gains" from the pool of initial applicants to the other Services, an effort should be made to expand the pool of initial Army applicants.

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Enlistment Motivation and the Disposition of Army Applicants

INTRODUCTION

Since the Second World War, the Army has been a primary recipient of manpower through the Selective Service System. Manpower requirements not met by recruiting efforts have been met by using the draft. With the termination of the draft in January 1973, the Army and other military services stand to suffer a great loss from the resulting dimunition of readily available, high quality manpower. An indirect effect of the draft on recruitment also merits mention. Not only are there no more inductees, but there are no more draft-motivated enlistees to the Army or the other Armed Forces.[1]

In the face of the increased competition for accessions presented by the advent of the all-volunteer force, it is essential that the Army derive a high level of effectiveness from its advertising and recruiting efforts. Two research activities will contribute toward attainment of this goal. First, the complex structure of reasons and factors that lead to the enlistment decision must be determined, as a basis for developing improved advertising themes and recruiting strategies. Second, it is important to isolate factors that predispose Army applicants to enlist in one of the other Services instead of the Army. Such research may lead to improving the recruiting success rate—that is, the ratio of the number of enlistments to the total number of qualified initial applicants. These two research problems are addressed in this report.

In October 1970, the Department of Defense initiated procedures for collecting trend data on enlistment motivation (including draft motivation) among Armed Forces enlisted accessions. Survey data were collected through the mechanism of an anonymous questionnaire administered every other week at approximately one-third of the Armed Forces Entrance and Examination Stations (AFEES) nationwide. While analytic studies based upon these data have been conducted in the past,[2] these analyses were typically concerned with combined Service data generated in an historic draft environment potentially quite different from the all-volunteer force environment. In contrast, the data described in this report were based upon more recent AFEES data (June 71 - June 72), and focused principally on Army enlistees.

Multivariate statistical analyses were used to explore the structure of enlistment motivation among recent Army enlistees. Additional analyses were performed to determine why some individuals who initially applied to the Army for enlistment subsequently enlisted in another branch of the Armed Services (a phenomenon termed "cross-elasticity"). The research literature on the topics of enlistment motivation and cross-elasticity was reviewed in support of the statistical analyses performed in this project.

SUMMARY OF THE LITERATURE AND FORMULATION OF THE PROBLEM

ALL-VOLUNTEER FORCE AND MANPOWER SUPPLY

In January 1973, the United States military services converted from a conscription system to a military service that will rely upon the enlistment of volunteers. The United States began moving toward the establishment of an all-volunteer military service in early

[1] Research was performed in a "draft environment," therefore the findings with respect to factors affecting selections of service may not be wholly applicable in the draft free environment in an All-Volunteer Armed Force.

[2] Studies on trends in enlistment motivation conducted by A.H. Fisher, Jr., HumRRO Division No. 7, for the Office of the Assistant Secretary of Defense (M&RA), 1972.

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1969 with the formation of the Gates Commission, which was established to assess the advisability and feasibility of this type of military operation. Since that time, much research has been done on the potential effects of an all-volunteer military service. This research has addressed the problems of obtaining a sufficient quantity of accessions (Altman and Fechter, 1; Bennett *et al.*, 2), the effects of the all-volunteer force on the quality of accessions (Snyder, 3; Bialek and McNeii, 4), and the related problem of manpower retention in the Armed Forces (Snyder, 3). While a majority of these studies dealt with both recruitment and retention, heavy emphasis has been placed upon the retention problem.

In spite of a reduction in the size of the regular military forces occasioned by the cessation of military activities in Southeast Asia, there is a substantial, recurring annual requirement for 600,000 to 700,000 accessions in the enlisted ranks. To illustrate the magnitude of the recruiting problem, it was estimated in May 1972 that there were approximately 3,525,000 available and qualified potential male applicants for military service,[3] implying that one out of every five or six of these youths must be recruited to accommodate the requirements of the four Services. Former Secretary of Defense Melvin Laird, in announcing the feasibility of suspension of the draft for the Active Force in January 1973, emphasized the continuing need for Congressional legislation to foster the development of appropriate incentive programs that would aid in maintaining necessary manpower levels for the Reserve and the National Guard. The Reserve has typically been aided in recruitment by the effects of the draft.

In addition, recent studies conducted by the Air Force (Vitola and Alley, 5; Vitola and Valentine, 6) indicate that enlistees in an all-volunteer force environment may be of lower aptitude and educational level than the enlistee population that includes draft-motivated men. This conclusion is supported by DoD findings that draft-motivated enlistees possessed superior aptitude and education compared to "true volunteers."[4] Deficits of qualified personnel may be especially strong in staffing military occupational specialties that require personnel with above average aptitude. A case in point is the difficulty encountered by the Navy in FY72 in recruiting men for nuclear submarine duty (Steinhauser, 7).

In order to counterbalance the predicted decrease in number of qualified personnel, improved recruiting programs involving the skillful use of incentives and the exploitation of existing motivations to enlist must be developed to increase the willingness of youth to join the Armed Services. In support of this goal, one of the major objectives of the current research is to identify a classification of reasons for enlistment (see following section, Reasons for Enlistment). This classification will be of value in developing a series of appeals designed to attract young men to enlist in the Army.

In order to develop an effective recruitment strategy in the competition for accessions, factors involved in the choice of Service must also be identified. The other objective of the current research is to provide knowledge on factors involved in the final branch of Service decision by applicants for enlistment (see section, Disposition of Applicants, p. 10).

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[3] Memorandum from MAJ David L. Stanley, Chief, Data Support Services, Department of Defense, Office of the Assistant Secretary of Defense (M&RA), 24 May 1972. The estimate was based on the assumption that although there were 7,236,000 men in the 18- to 21-year group, some 2,200,000 were ineligible because they were in school, and 30% of the remainder were unfit for military service, leaving a base of 3,525,000.

[4] An informal report to DoD on enlistment motivation, by A.H. Fisher, Jr. and G.J. Hartzler, HumRRO Division No. 7, in 1971.

REASONS FOR ENLISTMENT

One major objective of this project was to identify a classification (structure) of reasons for enlistment in the military service as given by Army enlistees. The specific research task involved a multivariate analysis of data on the endorsement of reasons for enlistment by samples of Army enlistees. The goal was to identify basic reasons for enlistment that might be used to "package" appeals to civilian youth.

As a supportive effort, an extensive literature review was conducted to identify the extent to which previous studies of the patterns (structure) of reasons for enlistment had been performed. This review was done to generate an historic perspective on extent of endorsement of the various reasons over the last 25 years, and also to trace the development of some basic categories of reasons for enlistment that were used in later studies.

Development of Basic Categories of Enlistment Motivation

In 1949, the Armed Forces Information and Education Division (AF I&E) posed the following open-ended question to approximately 1,600 Army enlistees: "Tell in your own words, all the reasons you had for enlisting in the Army."[5] This question was designed to elicit a comprehensive list of reasons for enlistment as stated in the words of the enlistee. The men were then asked to indicate which one of these reasons had influenced their enlistment decision the most (most important reason). AF I&E classified these responses into 10 major categories of reasons for enlistment in the Army (AF I&E, 8). (In another 1949 effort, AF I&E repeated the study on a sample of Air Force enlistees, and generated ten major categories of reasons for enlistment, 9.) It is instructive to review this initial classification. Many of the same "reasons" were used in subsequent surveys, and many are employed in the data analyzed in this study. The 10 reasons from the AF I&E research appear in Table 1.

Table 1

AF I&E Categories of Reasons for Enlistment

Number	Reason
1	Threat of forced service
2	Opportunity for vocational education and experience
3	Present financial considerations
4	Travel, adventure, new experiences
5	Escape from some uncomfortable civilian situation
6	Patriotic reasons
7	Need for self-discipline
8	Security of Army life
9	Military tradition in family
10	Miscellaneous classification

[5] An earlier study conducted by AF I&E posed a similar question to 1,600 Army enlisted personnel to determine why they enlisted in the Regular Army (1949). No data are presented on this sample because a majority of these men had previous Service experience during World War II, hence their responses we e not directly comparable with the results obtained from samples of accessions in surveys that are cited in Table 2.

Review of Research on Enlistment Motivation

Numerous studies of enlistment motivation have been conducted over the past 25 years, in addition to the research performed to develop major categories of reasons for enlistment. For example, in 1949 approximately 1,600 Army enlistees were asked to indicate the importance of 65 separate structured reasons in relation to their enlistment decision (8). Their endorsements of some of the 65 reasons (including certain of the 10 reasons in Table 1) appear in column 1 of Table 2. For the 1949 Army survey, the reason to which most influence was attributed was the opportunity for advanced education (31%).

The most recently reported survey of Army personnel was undertaken by Research Analysis Corporation (Rae, 10). Personnel in various pay grade categories were asked to select the three most important reasons for enlistment from among a structured list of 10 reasons. Results appear in column 2 of Table 2 for the sample of E1-E3 personnel. The following reasons were selected as most influential: (a) to learn a trade or skill valuable in civilian life (19%), (b) the opportunity for advanced education (18%), and (c) to serve my country (17%). Less influence was attributed to enlistment for increased maturity (13%), or for travel and new experiences (11%).

A related series of studies include evaluations of the Modern Volunteer Army (MVA/VOLAR) program conducted by the Systems Development Corporation (11) and by HumRRO (Goffard et al., 12, 13; Taylor and Vineberg, 14). Respondents participating in the HumRRO VOLAR surveys were asked to indicate which of 57 separate checklist items were (a) most important to them, and (b) most likely to be available in the Army. (See for example, Taylor and Vineberg, 14.) One item frequently endorsed as both important and available was "being able to get good medical and dental services," a personnel-benefits item. Other items judged most important centered on work and personal treatment. Work-related items included "doing interesting and satisfying work," "being sure I'll be able to earn a living," and "having a chance to plan my own future;" personal treatment items included "getting fair treatment on the job," "being treated with respect," and "being treated like a responsible person." Privacy was also cited. Items judged most available in the Army included educational opportunities, respect for superiors, and service to one's country. Other factors cited centered on social matters, such as the chance to make friends and to play sports (Taylor and Vineberg 14, pp. 37-40).

In the Systems Development Corporation study, it was determined that actions having the greatest overall effect on both attitudes and retention were in the areas of civilian hire (for KP), job assignment, opportunities for growth and experience, health care, and pay and benefits (11, p. 10).

The U.S. Navy has conducted an extensive research program investigating enlistment incentives. For example, samples of enlisted men were surveyed by the Naval Bureau of Personnel in 1967, 1968, and 1969, to determine the relative impact of personal contacts (family, friends, and acquaintances) personal reasons, and Navy publicity as influencing factors on enlistment decisions (Dupuy and Deimel, 15; Deimel and Blakelock, 16; Muldrow, 17). Results for the 1967 and 1968 surveys are reported in columns 3 and 4 of Table 2. Enlistees were asked to indicate the degree of influence that each of 12 reasons exerted on their enlistment decision. In both surveys, the reason cited most often was the opportunity for advanced education. This reason was endorsed by 94% of the sample in the 1967 survey, and 85% in the 1968 survey. In general, the majority of the samples attributed influence to most of the nine reasons appearing in Table 2. In reporting results of the 1969 version of the survey, Muldrow (17) indicated that the two most frequently cited reasons for Navy enlistment were the opportunity to obtain technical training (86%), and the desire to travel (82%).

Table 2

Summary of Reasons for Enlistment, Over Time
(Percent)

Reasons for Enlistment	Army		Navy			Air Force
	AF I&E[a] 1949 Survey (N=1,584)	RAC[b] E1-E3 1972 Survey (N=992)	BUPERS[c] 1967 Survey (N=2,618)	BUPERS[c] 1968 Survey (N=2,926)	NPRDL[d] 1972 Survey (N=6,795)	AF I&E[e] 1949 Survey (N=709)
Learn a trade or skill valuable in civilian life	NA	19	NA	NA	NA	NA
Opportunity for advanced education	31	18	94	85	39	47
Opportunity for training	NA	NA	NA	NA	58	NA
To enlist in my choice of Service	NA	NA	NA	NA	NA	NA
For travel, excitement, and new experiences	12	11	91	81	40	12
To serve at the time of my choice	NA	NA	84	77	NA	NA
For increased maturity and self-reliance	3	13	70	58	NA	4
To serve my country (patriotism)	4	17	89	79	32	1
Military career opportunities	NA	5	51	41	16	NA
Navy career	NA	NA	60	48	27	NA
The overall benefits: pay, room & board, medical care, and training	19	NA	NA	NA	NA	12
Retirement benefits	2	NA	NA	NA	NA	2
To qualify for the G.I. Bill	NA	NA	NA	NA	NA	NA
To avoid the draft	10	NA	57	29	30	7
To leave personal problems behind	8	NA	25	20	NA	10
All other reasons for enlistment	11	17				5
Total Percent	100	100				100

[a]Criterion Question. Tell in your own words all reasons you had for enlisting in the Army. Which one was the most important reason why you enlisted? (10 categories of reasons for enlistment were developed from these open ended responses.) (8)

[b]Criterion Question. Select the three most important items from the list which influenced your decision to enter the Army. (List of 10 reasons.) (10)

[c]Criterion Question. What influence did each of the following (reasons) have on your decision to join the Navy? (List of 12 reasons.) (15, 16)

[d]Criterion Question. Did (one of 11 reasons for joining the Navy) have anything to do with making up your mind to join the Navy? (Percent responding "Yes, a lot.") (18)

[e]Criterion Question. Tell in your own words all reasons you had for enlisting in the Air Force. Which one was the most important reason why you enlisted? (10 categories of reasons for enlistment were developed from these open ended responses.) (9)

NA - not asked

In the early 1970s, the Naval Personnel Research and Development Laboratory (NPRDL) initiated a longitudinal research project (PRINCE). The objective of the project was to "examine Navy incentives, policies and procedures, pre-Service and Service experiences, duty assignments, satisfaction, social influence and expectations as they affect the reenlistment intentions and career decisions of Navy men during their first enlistment" (Katz and Schneider, 18, p. ii). Preliminary results from the first sample are reported in column 5 of Table 2. The reason for selecting the Navy that was most frequently endorsed was the opportunity for technical training (58%), as reported by Katz (19).

As noted previously, AF I&E conducted a survey of reasons for enlistment on a sample of Air Force enlistees (AF I&E, 9). The reason for enlistment most frequently endorsed was the opportunity for advanced education (47%) (Column 6 of Table 2).

Research studies on enlistment motivation have also been conducted by the Air Force Human Resources Laboratory (HRL) (Mullins et al., 20, 21; Valentine and Vitola, 22; Vitola and Valentine, 23). Questionnaire items in these studies are not directly comparable to those used in the present research. Individuals in each of four Air Force surveys responded most positively to reasons that could be classified as "personal incentives" (e.g., "I felt I could learn more in the Air Force"). This response appears to be similar to the reason, "opportunity for advanced education" as used in surveys by the other Services. Other reasons frequently endorsed in the HRL research suggest "enlisting in my choice of Service," another major category used in the research by the other Services.

This historic review of the literature indicated that the "opportunity for advanced education and training" was the most frequently endorsed reason for enlistment in each of the Armed Services. However, other reasons were also frequently endorsed by enlistees, and it was difficult to perform a definitive inter-Service comparison of reasons given for enlistment because of the differences in the times when the studies were conducted and in the methodology employed. The need for a common research procedure applicable to enlistees for each Service is indicated by the difficulty in drawing general interpretations deriving from variations in research instruments.

The Armed Forces Entrance and Examination Stations (AFEES) Survey

Perhaps the most ambitious survey research study of enlistment motivation is the AFEES survey undertaken by the Department of Defense in October 1970 and analyzed by HumRRO.[6] The AFEES Survey involves a continuing program of cross-sectional sample surveys.[7] This research strategy permits development and accumulation of data, over time, on the reasons for enlistment endorsed by enlistees at accession.

As a perspective on the current study, it is instructive to review the extent of influence accorded each of the 12 reasons for enlistment that are analyzed in the current study. These AFEES data were obtained over the period of April 1971 to April 1972.

Table 3 indicates the percent who state that a particular reason exerted a *strong influence* on their decision to enlist. Data are based upon responses for combined samples of male Army, Navy, Marine Corps, and Air Force enlistees. There is considerable variation in the percent endorsing each reason as an influence in the decision to enlist. While the majority attributed strong influence to the acquisition of a trade or skill (63%) and to the opportunity for advanced education (59%), very few enlistees endorsed draft avoidance (21%), or enlistment to leave personal problems behind (11%).

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[6] Informal reports to DoD on enlistment motivation by A.H. Fisher, Jr. and G.J. Hartzler, and on selected interstudy analyses by A.H. Fisher, Jr. and L. Oberlander.

[7] These surveys were initiated by the Office of the Assistant Secretary of Defense (M&RA) to determine reasons for enlistment in the military services as reported by current enlistees.

Table 3

Percent Attributing Strong Influence to
Each Reason for Enlistment[a]
(Base: AFEES Survey Total Sample,
April 1971 to April 1972)

Reason	Percent
Learn a trade or skill valuable in civilian life	62.9
Opportunity for advanced education and training	59.0
To enlist in my choice of service	54.5
For travel, excitement, and new experiences	44.0
To serve at the time of my choice	42.4
For increased maturity and self-reliance	41.8
To serve my country (patriotism)	40.7
Military career opportunities	40.2
The overall benefits: pay, room and board, medical care, and training	29.6
To qualify for the G.I. Bill	26.7
To avoid the draft	21.3
To leave personal problems behind me	10.8

[a]Informal report to Department of Defense by A.H. Fisher, Jr., on trends in enlistment motivation.

The total study data in Table 3 do not show the substantial differences in enlistment motivation between Services, for example, the endorsement of maturity and patriotism by Marine Corps enlistees, and of the opportunity for advanced education or trade/skill acquisition by Navy and Air Force enlistees. However, the present report does give FY72 data on the endorsement of reasons for enlistment among *Army enlistees.*

Data in Table 3 also do not address the basic question posed in this study: *What are the patterns of interrelationships involved in the endorsement of these 12 reasons?* For example, do the same men who endorse trade/skill acquisition as an influence in enlistment also tend to endorse the opportunity for advanced education as a reason for enlistment? And do the same recruits also attribute enlistment influence to "patriotism"? The present study is designed to provide answers to questions of this nature.[8]

Data analyses conducted to identify a classification of reasons for enlistment could have been performed on data for the total FY72 sample of accessions (or on data for all Army FY72 enlistees), were it not for certain dynamic changes occurring in the enlistment milieu during FY72. First, the military compensation for enlisted men was increased substantially midway through FY72, and it was felt that this increase might alter the structure of reasons for enlistment. Second, endorsement of certain reasons

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[8]Analogous research has been performed to identify common factors involved in the decision to apply for officer training by enrollees in OCS, by A.H. Fisher, Jr., HumRRO Division 7, March 1972.

differed considerably over time—"draft-avoidance" declined in endorsement, while "personnel benefits (including pay)" increased. Figure 1 presents the trends over the period of April 1971 to April 1972.

Trends in Selected Reasons for Enlistment (Strong Influences),
  Total AFEES Sample
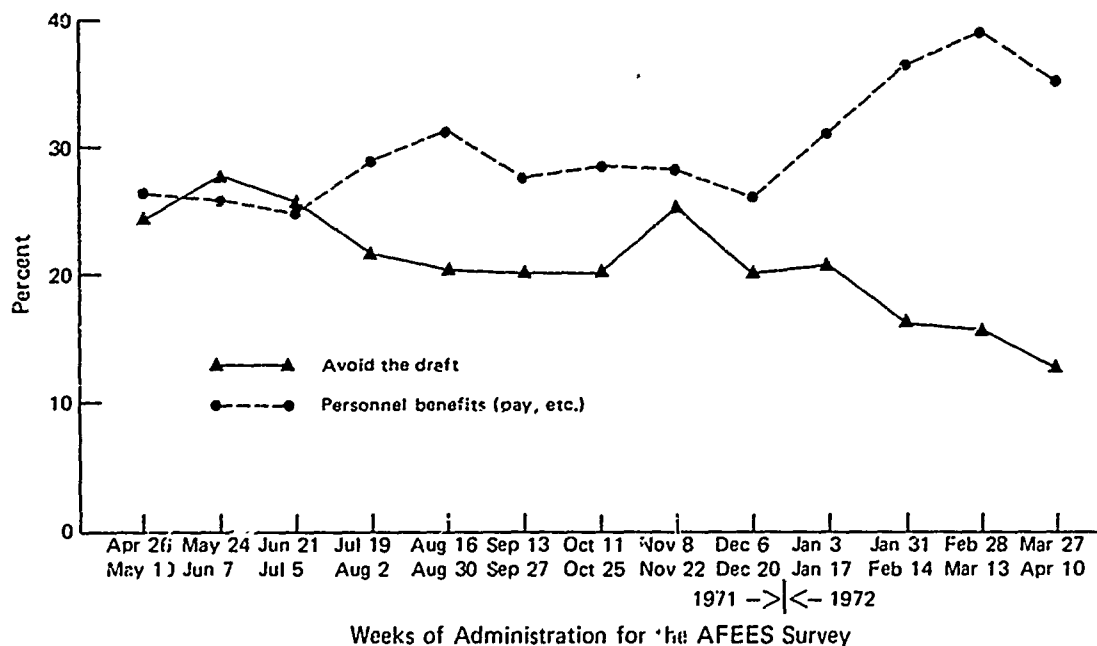
Figure 1

For these reasons, the decision was made to perform separate analyses of the structure of reasons for enlistment on samples of Army enlistees from the first half of FY72 and the second half of FY72. Given separate results for the two time periods, it would be possible to compare and contrast the structure of reasons for enlistment for Army enlistees during these periods. This comparison would indicate whether the current (higher) pay/reduced draft environment attracted Army enlistees whose structure of reasons for enlistment differed from those of Army enlistees who entered the Service under the conditions of lower pay and higher draft levels.

This analysis, employing multivariate statistical techniques, would extend the level of sophistication in the use of the AFEES survey data. Specifically, instead of reporting only percentage endorsement of each reason, the current study identifies a classification of reasons for enlisting in the Army. This classification includes a factor structure of reasons for enlistment, as generated by factor analysis. It also includes a cluster pattern of reasons for enlistment, as generated through hierarchical cluster analysis.

DISPOSITION OF APPLICANTS

The second major objective of this project was to identify factors involved in the final branch of Service decision. This objective encompasses the fact that a certain

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percentage of the Army's initial applicants for enlistment do *not* enlist in the Army. Instead, they may enlist in another branch of the Armed Services. (Conversely, the Army enlists some recruits who initially apply to the other Services.) Since little quantitative information is available about the factors that are associated with the final branch of Service decision, the present study attempts to identify demographic correlates and other factors associated with this phenomenon. Previous research that defines the phenomenon was reviewed, and results are presented to indicate the relative extent to which each Service succeeded in enlisting men who first applied to that Service. Selected results that identify first-order correlates of this phenomenon are also reviewed. This research applies to the general problem of cross-elasticity[9] (i.e., the extent to which potential enlistees to a Service are attracted to another Service as opposed to enlisting in the Service to which they first apply).

Background of the Problem

Kubala and Christensen (24) identified cross-elasticity as a recruitment problem as early as 1965. In a study on factors influencing the choice of enlistment options among Army enlistees, these researchers classified those potential recruits who did not enlist into three categories:

    (1) Men who were ineligible for their chosen Service option.

    (2) Men who selected an option that was not available.

    (3) Men who declined enlistment for other reasons.

Anecdotal information suggested that those who declined enlistment for an unspecified reason *enlisted in another branch of Service* or decided to wait and be drafted.

However, few researchers have done more than to draw attention to the cross-elasticity phenomenon (e.g., see Friedman, 25, p. 19). No systematic research has been undertaken to assess the problem of why certain Services lose potential enlistees to other Services, or why these other Services are able to attract recruits away from the Services to which they initially apply. Fisher[10] has investigated cross-elasticity in terms of apparent selectivity (e.g., rejection of initial applicants possessing less education and lower AFQT scores).

Two Objectives in Recruitment

The recruiting problem can be viewed in terms of the relative success with which each branch of the Armed Services accomplishes two objectives: (a) Initially attracts men who wish to serve in that particular branch of Service <u>and</u> enlists these applicants, and (b) enlists men initially attracted to other Services who were <u>not</u> enlisted by these Services. Historically, much of the effort in advertising and recruitment has been directed toward achievement of the initial objective.

The present study is concerned with the attainment of the initial objective in two ways: (a) the development of packaged appeals (reasons for enlistment) that can be used to increase the pool of men initially attracted to the Army; and (b) the identification of factors associated with the disposition of Army applicants, that is, factors that may be exploited to increase the rate of enlistment of initial applicants. Multivariate analyses were performed to identify factors associated with the enlistment of applicants by the Army and the other Armed Services, in order to provide information that would assist

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[9] The term was first employed by USAF researchers to describe one of the potential effects of selective enlistment bonuses on the decision of youth regarding branch of Service (Personal communication from LTC J.M.L. Karns (USAF) to Dr. Allan H. Fisher, Jr of HumRRO, June 1972).

[10] Research on trends in enlistment motivation by A.H. Fisher, Jr., HumRRO Division 7, in 1972.

the Services in increasing their rates of enlistment of qualified applicants. This goal is consistent with the "marketing concept" of "selling" a high percentage of the potential customers attracted through advertising or motivated by other influences.

The present study also addresses the second objective. If each branch of the Armed Service achieved its quotas by attracting sufficient applicants and enlisting a sufficient percentage of only these applicants, presumably there would be no interest in absorbing initial applicants of the other Services who were not enlisted by those Services, and no interest in studying this phenomenon. However, whenever a Service fails to meet its recruiting quota directly, it may be necessary to determine whether the remaining quota can be met by enlisting men initially attracted to the other Services who are not, for some reason, enlisted by those Services. In this case, information useful in recruiting such applicants becomes highly relevant. For example, if one Service is highly selective in its policy of enlistment, it may reject applicants who would prove excellent candidates for enlistment in another Service. An active attempt to enlist such applicants would appear to be a promising strategy.[11] The offering of enlistment bonuses on a selective, by-Service basis is another potential strategy that might be used to attract men who had not enlisted in other Services, as is the offering of attractive enlistment options not offered by other Services (e.g., shorter enlistments).

To the extent that a Service attempts (a) to enlist a very high percent of its initial applicants, and/or (b) to enlist applicants who first contacted another Service, the Service is involved in using cross-elasticity. This research explores both problems. Since most enlistees are men who first apply to a particular service, a successful program of attracting and enlisting initial applicants is essential. However, the success with which a Service also enlists men initially attracted to the other Services may well determine whether the Service fills its recruiting quota. The latter concern acquires particular importance when the pool of applicants is limited in relation to the total recruiting quota of all the Armed Services. In such a case, the Services must compete with one another for available manpower, and the enlistment of men rejected by (or not disposed to enlist in) other Services may be an enlightened strategy for recruitment.

Service Effectiveness in Enlisting Own Applicants

One method of viewing the competition for enlisted manpower is to formulate the recruiting problem in terms of the primary objective, that is, the extent to which each Service successfully enlists those men who initially apply to that Service for enlistment. Another term for this phenomenon is the *conversion process* (Friedman, 25).

In the most general terms, the "applicant pool" would include all male civilian youth who apply to each Service in a particular period of time (e.g., in one month). Some of these men would eventually enlist, while others might decide not to enter the Armed Services by enlistment.[12] However, in this project, available data permit the analysis of the disposition of only one subset of men—those who apply to each Service and who also enlist in one of the Services. This subset of all applicants may be termed "serious qualified applicants," since they, in fact, were subsequently enlisted in one of the Armed Services.[13] This also means that they were qualified for enlistment in at least one Service.

[11] The application of this strategy would presumably be on a selective basis, since DoD policy emphasizes cooperation between the several Armed Services in the attainment of their quotas for recruits.

[12] Other possible options not addressed in this research involve affiliation with the Reserve/National Guard; or delayed entry into the Officer component following the completion of ROTC programs, or other off-campus military officer training programs; or delayed enlisted or officer service after attending college or junior college.

[13] Excluded from the data base are inductees and men who apply to the Armed Services but do not enlist.

Research was performed at two points in time to determine the extent to which each Service enlisted those "qualified serious applicants" who first attempted to enlist in each respective Service. The analyses were performed for men who entered the Armed Services in (a) October and November 1970, and (b) September 1971 through January 1972—approximately one year later.[14] Table 4 indicates the percent of men each Service enlisted from its respective pool of serious applicants, at each point in time.

Results provide an historic background on the problem of enlisting the "qualified serious applicant." The data on these serious applicants may be read as follows: of all those men who first applied to one Service in one time period, X% were enlisted. For example, of all the men who first applied to the Army in October-November 1970, 94% of the initial serious applicants were enlisted (converted) by the Army, while the remaining 6% enlisted in one of the other Armed Services.

Table 4

Percent of Initial Serious Applicants
Enlisted by Each Service
(Base: AFEES Survey of Enlisted Men)

Service	October-November 1970 (N=6,877)	September 1971-January 1972 (N=11,174)
Army	94	92
Navy	71	80
Marine Corps	74	84
Air Force	93	88

In each time period, the Army and the Air Force tended to enlist a higher percentage of their initial applicants than did the Navy or the Marine Corps. The differences between Services were not as pronounced in September 1971-January 1972 as they were in the previous year. Nonetheless, Navy and Marine Corps rates still lagged behind Army and Air Force rates of enlisting their own applicants. These results address the initial recruitment objective as posited: the attraction and enlistment of one's own applicants.

The implications of the previous findings achieve importance when considered in the context of the attempts by each Service to achieve their respective recruitment quotas. In the October-November 1970 period, the Navy achieved its quota in spite of high selectivity—only 71% of initial Navy applicants enlisted in the Navy, while 29% of initial Navy applicants subsequently enlisted in another Service.[15] However, in the more recent period of September 1971-January 1972, the Navy failed to achieve its recruitment

[14] Analyses were performed at the request of Mr. Frederick W. Suffa (OASD, M&RA), in attempt to explore possible reasons for the recruitment problem faced by the U.S. Navy in FY72.

[15] Indeed, the Navy reportedly had a substantial "delay pool" of enlistees awaiting entry during this period. Thus, based upon selection ratio, the Navy could afford to employ a policy of extreme selectivity. Personal communication, Mr. Frederick W. Suffa (OASD, M&RA), April 1972.

objectives,[16] although in this period the Navy enlisted 80% of its initial applicants, while 20% were subsequently enlisted in another Service.[17]

Review of the data from the previous analyses raised the basic question of which Services were able to attract initial applicants from the other Services, that is, to meet the second objective for recruiting. To answer this question, the complete "transition matrix" that indicated the disposition of initial applicants was obtained. The matrix in Table 5 illustrates the extent to which applicants for each Service were enlisted in another Service.

Table 5

Disposition of Initial Applicants for Enlistment
(Base: AFEES Sample Survey Data for FY72)

Service Initially Applied To	Service in Which Enlisted				Total Percent
	Army (%)	Navy (%)	Marine Corps (%)	Air Force (%)	
Army	91	3	4	2	100
Navy	12	79	5	5	101[a]
Marine Corps	9	3	86	2	100
Air Force	7	4	3	86	100

[a]Exceeds 100% because of rounding.

The extent to which the Army was successful in enlisting initial Navy applicants (12%) is particularly noteworthy. This is the largest off-diagonal percentage as well as the largest off-diagonal numeric value in this matrix.[18] Also important are the relatively high percentages of both initial Marine Corps applicants (9%) and initial Air Force applicants (7%) enlisted by the Army in this period. The Army had the highest applicant conversion rate (91%) of any of the Services over the entire FY72 period.[19]

In summary, the Army appeared best able to accommodate both initial objectives: (a) attraction and enlistment of one's own applicants, and (b) enlistment of men initially attracted to other Services.

Factors Associated With the Disposition of Initial Applicants

Review of these findings raised several additional questions. The basic question was *why* did each Service "lose" (or "reject") some of its applicants to the other Services? If

[16]Orr Kelly, "Volunteer Army in Question," article in the *Washington Star*, March 19, 1972, p. A-18.

[17]Additional analyses of the data were performed to determine whether the quality of Navy applicants was such that a policy of rejecting many applicants was essential. The results of the analysis indicated that, on the contrary, the Navy attracted the highest quality applicant of any Service in this period.

[18]See Appendix A for the detailed percentage values and the raw data counts that were used in computation of these percentages.

[19]The Air Force rate showed a decline in the later months of FY72, presumably because of the decrease in Air Force recruiting quotas and the associated ability of the Air Force to meet these quotas while being more selective in the disposition of its applicants than was the case in early to middle FY72.

a Service (e.g., the Army) could learn the factors associated with this loss of applicants, perhaps the loss could be reduced; the result would then be a net gain of manpower without the necessity of attempting to achieve a net increase in the total available civilian pool of applicants for enlistment.

The reasons for the "loss" of applicants to another Service appeared intuitively to include (a) the selection criteria imposed by the initial Service, and/or (b) the desires of the applicant as opposed to the options offered to him by the initial Service. Preliminary study of AFEES data showed that the disposition of initial applicants was, in fact, a function of (a) the selection process, (b) draft motivation on the part of the applicant, and (c) the influence of parents, friends, and recruiters on the applicant such that:

(1) Aptitude was related to the disposition of applicants, because each Service appeared to select the "cream of the crop" of its applicants.

(2) Draft motivation was related to the disposition of applicants in that men who reported the prior receipt of a draft notice were more likely to enlist in a Service other than the Service to which they initially applied; that is, evidence of "shopping" behavior was noted.

(3) More complex findings were noted for the influence of parents, friends, and recruits. For example, the AFEES data suggest that the Army recruiter was a positive influence in both the conversion of initial Army applicants to Army enlistees, and in the enlistment of men into the Army who had initially applied to the Navy.

Each of these findings involved the demonstration of first-order relationships between the particular variables and the phenomenon of cross-elasticity. However, there was no information available on the interaction of the variables or factors associated with the disposition of initial applicants. It was determined that existing (AFEES) data could be analyzed to provide this information. Hence, the current research was conducted to identify factors (positive and negative) that, in combination, are involved in the enlistment of Army applicants into the Army, or that are involved in the selection of another Service. Analogous research was also performed on applicants to the other Services to compare and contrast factors involved in enlistment for those Services as well.

METHOD

QUESTIONNAIRE CONTENT

In late 1970, the initial version of an anonymous questionnaire was designed by the Department of Defense to elicit reasons for enlistment and demographic information from current enlistees. The reusable questionnaire initially included 33 multiple-choice items, and was designed to be used with a separate OPSCAN answer sheet. An additional item (AFQT mental ability category) was coded for inclusion by questionnaire administrators at the AFEES site of administration. Also coded was the particular AFEES site providing the answer sheet.

In early 1971, the AFEES questionnaire was revised. The version analyzed in this report also included four items on the image of the Services. The FY72 questionnaire included a total of 37 multiple-choice items. The additional item (AFQT mental ability category) remained coded for inclusion at the site of administration.[20]

The data analyses performed to identify a classification of reasons for enlistment focused on questionnaire items 1-12. These items and their associated instructions to the respondent appear in Figure 2.

[20]Appendix B contains a copy of the current questionnaire. Appendix C contains a list of the sample sites.

Questionnaire Items on Reasons for Enlistment

> Questions 1 through 12 are reasons that may have influenced you to enlist. Using the scale below, indicate to what extent each of the reasons influenced your decision. For example, if "Career opportunities in the military looked better than in civilian life" was a strong influence for you to enlist, you would mark answer "A" for question 1 on your answer sheet.

		Strong Influence	Some Influence	No Influence
1	Career opportunities in the military looked better than in civilian life.	A	B	C
2	To become more mature and self reliant.	A	B	C
3	To learn a trade or skill that would be valuable in civilian life.	A	B	C
4	For travel, excitement and new experiences.	A	B	C
5	To serve my country.	A	B	C
6	I wanted to leave some personal problems behind me.	A	B	C
7	I wanted an opportunity for advanced education and training.	A	B	C
8	I wanted to qualify for the G.I. Bill.	A	B	C
9	The overall benefits—pay, room and board, medical care, and training.	A	B	C
10	To avoid the draft.	A	B	C
11	I wanted my choice of Service.	A	B	C
12	To fulfill my military obligation at a time of my choice.	A	B	C

Figure 2

In addition, data analyses were undertaken on questionnaire items 17 and 18, which were combined to yield an index of cross-elasticity. These questions are:

17. In which Armed Service have you enlisted?
   I have enlisted in the:
   A. Army
   B. Navy
   C. Marine Corps
   D. Air Force

18. If you tried to enlist in *another* Service, in which Service did you *first* try to enlist?

   A. I did not try to enlist in another Service
   B. I tried to enlist in the Army
   C. I tried to enlist in the Navy
   D. I tried to enlist in the Marine Corps
   E. I tried to enlist in the Air Force

A variety of additional questionnaire items were employed in the investigation of factors associated with cross-elasticity. Table 6 contains this list of questions.

Table 6

List of Variables Used in
the Analysis of Cross-Elasticity

Questionnaire Item Number	Variable
1-12	Twelve reasons for enlisting (see Figure 2)
14	Type of high school education (academic, general,[a] business, technical, other)
15	Trade school exposure (yes, no)
16	Receipt of draft notice prior to enlistment (yes, no)
25	Employment status prior to enlistment (employed or not)
27	Age at entry (17, 18, 19, 20, 21, 22 or older)
40	Level of education (non-high school grad, high school grad, some college, college)
42	Marital status (married, unmarried)
43	Race (White, other)
48	AFQT Mental Cateogry (I, II, III, or IV)
23	Personal influences in the choice of Service (recruiting publicity, recruiter, family or relatives, friend in the Service, etc.)
24	Media influences in the decision to enlist (radio, TV, newspapers, magazines, military publications, posters, movies, none of these[a])

[a]Variable deleted in multiple regression analysis.

DESCRIPTION OF THE SAMPLE

Data in this report were obtained during the months of June 1971 through June 1972 (i.e., for the period of approximately FY72). Table 7 indicates the precise weeks of survey administration and the total sample size for each bi-weekly period. The total sample during the study period included 25,878 enlistees. Of this number, 10,163 (39%) were Army enlistees.

Two Army subsamples were used in the analyses performed to generate a classification of reasons for enlistment: (a) first half of FY72 (N = 6,442), and (b) second half of FY72 (N = 3,721).

In the analyses of factors associated with cross-elasticity, the sample sizes were based upon the number of initial applicants to each Service. Army applicants—9,445; Navy applicants—7,171; Marine Corps applicants—3,151; and Air Force applicants—6,111.

Table 7

AFEES Survey Data and
Sample Size Per Administration

Administration Dates	DoD Total Sample Size	Army Sample Size
First Half		
21 JUN/5 JUL 71	2,557	
19 JUL/2 AUG 71	2,137	
16 AUG/30 AUG 71	2,546	
13 SEP/27 SEP 71	2,964	6,442
11 OCT/25 OCT 71	2,594	(37.6%)
8 NOV/22 NOV 71	2,568	
6 DEC/20 DEC 71	1,756	
Second Half		
3 JAN/17 JAN 72	1,292	
31 JAN/14 FEB 72	1,688	
28 FEB/13 MAR 72	1,693	3,721
27 MAR/10 APR 72	1,562	(42.5%)
24 APR/8 MAY 72	1,126	
22 MAY/5 JUN 72	1,395	
Total N	25,878	10,163

DETAILS OF SURVEY ADMINISTRATION

Data from the FY72 AFEES survey of enlisted personnel were based upon responses obtained from administrations conducted at a common sample of 25 AFEES sites nationwide (out of a total of 74 AFEES sites). The 25 AFEES sampling sites included in the survey were selected by DoD to represent small, medium, and large recruiting sources within the five major recruiting districts.

The AFEES questionnaire was administered to a 100% sample of male enlistees at each of the 25 AFEES sites, on an alternate week basis. Respondents were assured anonymity. Responses to questionnaire items were entered on a separate answer sheet by the respondent. Following each two week accumulation of data, tapes containing edited versions of these responses (range checks having been performed) were provided to HumRRO for data analysis purposes.

DATA ANALYSES

There were two data analysis phases in this project, the first to identify patterns of reasons that reportedly influenced a recruit to enlist in the Army, and the second to identify factors associated with the phenomenon of cross-elasticity, in which an applicant who initially applies for enlistment to one Service may ultimately enlist in another Service.

Reasons for Enlistment

To address the initial research objective, 1972 Army enlistee data from the AFEES survey on reasons for enlistment were analyzed using two multivariate statistical techniques: factor analysis and hierarchical clustering. Each technique is described briefly below.

Factor analysis may be used to reduce a large number of variables to a more parsimonious number of independent factors. In this study, factor analysis provided one statistical approach to identifying categories of reasons for enlistment. Principal components factor analyses were performed using the 03M Biomed routine, with orthogonal varimax rotation (Dixon, 26).

In addition, an alternative analysis technique showed promise and was applied to the data: the hierarchical cluster analysis algorithms of Johnson (27). Cluster analysis techniques were judged particularly appropriate in the analysis of data used to generate a classification of reasons for enlistment. First, the techniques are useful when there is no theoretical scheme or model to guide an analyst through a large matrix of data (Johnson, 27, p. 241). Second, a major contribution of cluster analysis is its ability to reveal natural groupings, or types or cluster inherent in the data itself; the clusters are not formed by the use of some external criterion of classification (Friedman and Rubin, 28, p. 1159). Third, the cluster analysis algorithms of Johnson (27) have the property of generating a hierarchical structure, in which the clusters are subsumed into an increasingly comprehensive structure that graphically describes the relationships between the reasons-for-enlistment clusters. This property was felt to be important in communicating a comprehensive structure of reasons for enlistment. Finally, cluster analysis is somewhat less restrictive in terms of assumptions than is factor analysis.

The expected outcome of this research was a classification of the 12 reasons for enlistment among men who joined the Army in FY72. Because of the possible effects of time and events on the outcome of the analysis, the sample was divided into two subsamples consisting of men who enlisted in the Army in the periods of June 1971 to December 1971, and men who enlisted in the Army from January 1972 to June 1972.

Correlations were computed based on the attribution of influence to each enlistment reason with every other reason, for each subsample. The resulting 12 x 12 matrices from each subsample (time period) were then used for the factor analysis and cluster analyses.

Factors Associated With Cross-Elasticity

To address the second objective of the project, *applicant data* from the FY72 AFEES survey were analyzed, using two techniques: multiple linear regression and automatic interaction detection (AID).

The objective of AID is to classify respondents into groups, so that the respondents in each of the groups are similar to one another, but different from respondents in the other groups (Armstrong and Andress, 29). Similarity is judged on a dichotomized criterion (e.g., Army applicant/Army enlistee vs. Army applicant/enlistee to another Service). The AID procedure simply involves splitting a total group into subgroups based upon the "most important" (independent) variable by reference to the dichotomous criterion (Table 6 lists the variables). Each subgroup is further split on its own most important variable, and the iterative process repeats until one of several termination criteria apply[21] (Cramer, 30). The outcome of the AID analysis is a "tree" (or branching

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[21]At each stage, tests of statistical significance are applied to determine whether further splitting would reduce the unexplained variance by more than a prespecified minimum. Another termination criterion involves the sample size in each cell that would result from splitting each subgroup; that is, a prespecified minimum sample size must be exceeded for splitting to continue. A final termination criterion is the maximum number of splits to be made. For this study, the criteria were (a) split-eligibility and split-reproducibility = .00001, (b) min. N ≥ 100, and (c) max. splits ≤ 30, respectively.

diagram) of the factors related to the criterion variable. The AID routine in the OSIRIS package was used in these analyses (University of Michigan, <u>31</u>).

Another multivariate analysis technique, multiple regression, was applied to the data on initial applicants to identify factors related to cross-elasticity. The PH720 multiple regression routine in the OSIRIS package was used in these analyses (<u>31</u>).

Both the AID and the multiple regression analyses were performed for independent samples of initial applicants to each of the four Armed Services (Army, Navy, Marine Corps, and Air Force), using the FY72 AFEES survey data base.

RESULTS

ENDORSEMENT OF THE 12 REASONS BY THE ARMY SAMPLES

It is useful to review the extent of endorsement of each of the 12 reasons by the two FY72 Army subsamples, prior to reviewing results of attempts to classify the reasons. The values in Table 8 derive from the subsamples of the first one-half of FY72 and the second one-half of FY72, respectively.

Table 8

Extent of Strong Influenc . Attributed to Each Reason for Enlistment
(Base: Army Samples for FY72)

Reason	Army Samples	
	First Half of FY72 (%)	Second Half of FY72 (%)
Learn a trade or skill valuable in civilian life	56.7	58.7
Opportunity for advanced education and training	53.5	58.1
To enlist in my choice of Service	45.6	42.6
For travel, excitement, and new experiences	44.4	44.3
To serve at the time of my choice	43.5	39.9
For increased maturity and self reliance	42.1	42.8
To serve my country (patriotism)	41.3	41.8
Military career opportunities	36.2	41.4
The overall benefits: pay, room & board, medical care, and training	28.0	36.3
To qualify for the G.I. Bill	30.1	31.8
To avoid the draft	22.5	16.1
To leave personal problems behind me	12.7	11.1

For each subsample, the reasons most frequently accorded strong influence in the decision to enlist were:
(1) To learn a trade or skill valuable in civilian life (increased from 57% to 59%).
(2) The opportunity for advanced education and training (increased from 54% to 58%).

Conversely, the reasons least attributed strong influence in the decision to enlist by the two samples of Army enlistees were the following:
(1) To avoid the draft (decreased from 23% to 16%).
(2) To leave personal problems behind me (decreased from 13% to 11%).

Certain trends in the endorsement of the various reasons are noteworthy. There was a significant increase over time in the endorsement of (a) overall personnel benefits, including pay (from 28% to 36%), and (b) military career opportunities (from 36% to 41%). An increase was also noted in the endorsement of the opportunity for advanced education and training (from 54% to 58%).

Conversely, there was a significant decrease over time in the attribution of influence to draft avoidance (from 23% to 16%). Other reasons declining in influence were enlisting to obtain one's choice of branch of Service (from 46% to 43%), and enlisting to serve at the time of one's choice (from 44% to 40%).

A review of these results shows that the major appeals or reasons for enlistment would seem to center on education and training. However, the performance of multivariate analyses of these data indicates the existence of interesting patterns (factors, clusters) of reasons for enlistment. In short, a classification of these reasons for enlistment may be generated that adds substantially to an interpretation of the interrelationships of the 12 reasons as separately percentaged in Table 8.[22]

CLASSIFICATIONS OF REASONS FOR ENLISTMENT

First Half of FY72

The two cluster analysis algorithms of Johnson (27)—the connectedness method and the diameter method—were applied to intercorrelation data on reasons for enlistment obtained from Army enlistees in the first half of FY72.[23] Four major clusters of reasons for enlistment were identified from the application of each algorithm:

Cluster 1 - Enlisting to learn a trade or skill that would be valuable in civilian life (Reason 3); because I wanted an opportunity for advanced education and training (Reason 7); and because career opportunities in the military looked better than in civilian life (Reason 1).

Cluster 2 - Enlisting because I wanted my choice of Service (Reason 11); to fulfill my military obligation at a time of my choice (Reason 12).

Cluster 3 - Enlisting to become more mature and self-reliant (Reason 2); for travel, excitement and new experiences (Reason 4); to serve my country (Reason 5).

Cluster 4 - Enlisting to qualify for the G.I. Bill (Reason 8); to obtain the overall benefits—pay, room and board, medical care, and training (Reason 9).

Cluster 1 appears to measure career development motivation, involving the acquisition of a trade or skill useful in civilian life and the desired opportunity for advanced

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[22] The intercorrelations between the reasons appear in Appendix D.
[23] For a technical discussion of the clustering process, see Appendix E.

Classifications of Reasons for Enlistment: Application of Two Clustering Schemes to Army Enlistee Data for First Half of FY72

Connectedness Method

		Item Numbers											
		0	1	0	0	0	0	0	0	0	0	1	1
		6	0	4	2	5	1	3	7	8	9	1	2
Solution Level	Proximity			←— 3 —→			←— 1 —→			←— 4 —→		←—2—→	
1	.54	I	I	I	I	I	I	XXX	I	I	I	I	
2	.44	I	I	I	I	I	XXXXX		I	I	I	I	
3	.37	I	I	I	I	I	XXXXX		I	I	XXX		
4	.35	I	I	I	XXX	XXXXX			I	I	XXX		
5	.34	I	I	XXXXX	XXXXX				I	I	XXX		
6	.34	I	I	XXXXXXXXXX				I	I	XXX			
7	.31	I	I	XXXXXXXXXX			XXX	XXX					
8	.30	I	I	XXXXXXXXXXXXXX				XXX					
9	.28	I	I	XXXXXXXXXXXXXXXXXX									
10	.15	I	XXXXXXXXXXXXXXXXXXXX										
11	.14	XXXXXXXXXXXXXXXXXXXXXXX											

Diameter Method

		Item Numbers											
		1	0	0	0	0	0	0	0	0	0	1	1
		0	6	4	2	5	1	3	7	8	9	1	2
Solution Level	Proximity			←— 3 —→			←— 1 —→			←—4—→		←—2—→	
1	.54	I	I	I	I	I	I	XXX	I	I	I	I	
2	.47	I	I	I	I	I	XXXXX		I	I	I	I	
3	.37	I	I	I	I	I	XXXXX		I	I	XXX		
4	.35	I	I	I	XXX	XXXXX			I	I	XXX		
5	.33	I	I	XXXXX	XXXXX				I	I	XXX		
6	.31	I	I	XXXXX	XXXXX			XXX	XXX				
7	.24	I	I	XXXXXXXXXX			XXX	XXX					
8	.14	I	I	XXXXXXXXXX			XXXXXXX						
9	.04	I	XXXXXXXXXXXX				XXXXXXX						
10	.01	I	XXXXXXXXXXXXXXXXXXXX										
11	−.23	XXXXXXXXXXXXXXXXXXXXXXX											

Item No.	Reasons for Enlistment
01	Career opportunities in the military looked better than in civilian life.
02	To become more mature and self reliant.
03	To learn a trade or skill that would be valuable in civilian life.
04	For travel, excitement and new experiences.
05	To serve my country.
06	I wanted to leave some personal problems behind me.
07	I wanted an opportunity for advanced education and training.
08	I wanted to qualify for the G.I. Bill.
09	The overall benefits—pay, room and board, medical care, and training.
10	To avoid the draft.
11	I wanted my choice of Service.
12	To fulfill my military obligation at a time of my choice.

Figure 3

education and training. The concept of military career opportunities is another reason included in this cluster.

Cluster 2 seems to reflect personal choice and convenience, including the desire for obtaining the branch of service of one's choice (Army), and serving at the time of one's choosing.

Cluster 3 suggests the motives of individual development and maturation, including the desire for travel and excitement, and increased maturity. Patriotism is another reason included in this cluster.

Cluster 4 appears to measure the attraction of <u>military personnel benefits</u>, involving both the overall benefits as enumerated to the enlistee, and qualification for the G.I. Bill. Results are shown in Figure 3.

Note that in each of the hierarchical solutions, the two clusters composed of reasons 1, 3, and 7 (Cluster 1) and of reasons 2, 5, and 4 (Cluster 3) tend to cluster together. These clusters represent *career development motivation* and *individual development and maturation*, respectively. This result suggests some degree of communality in the endorsement of these two major clusters of reasons for enlistment. Both clusters involve some aspect of training, education, and personal development. In addition to the desire for trade or skill acquisition and advanced education, they involve reasons such as the desire for increased maturity and self-reliance, as well as reasons such as patriotism, and the desire for travel, excitement and new experiences—reasons that one might well assume to be independent of training or education as motives for enlistment. These data suggest that such an assumption is erroneous, although the extent of agreement of the various reasons is not overly strong.

Finally, the two clustering methods suggest that two reasons are essentially independent of the four major clusters. These relatively "unique" reasons are (a) enlistment to leave some personal problems behind (Reason 6), and (b) enlisting to avoid the draft (Reason 10). These reasons were accorded the lowest proximity values in each solution and they were accorded little influence in enlistment (See Table 8). Endorsement of these reasons appears to be unrelated (or negatively related) to endorsement of the reasons subsumed by the four major clusters.

The same intercorrelation data from Army enlistees in the first half of FY72 were also subjected to factor analysis. A four-factor orthogonal rotation showed the existence of factors quite similar to the four clusters just described.[24] The four factors were the following:

Factor I - Enlisting to learn a trade or skill that would be valuable in civilian life (Reason 3); because I wanted an opportunity for advanced education and training (Reason 7); and because career opportunities in the military looked better than in civilian life (Reason 1). Enlisting to avoid the draft (Reason 10) had a *negative loading* on this factor.

Factor II - Enlisting because I wanted my choice of Service (Reason 11); to fulfill my military obligation at a time of my choice (Reason 12). Patriotism (Reason 5) was also related to this factor.

Factor III - Enlisting to qualify for the G.I. Bill (Reason 8); and to obtain the overall benefits: pay, room and board, medical care, and training (Reason 9). Also loading positively on this factor was enlistment to avoid the draft (Reason 10).

Factor IV - Enlisting to become more mature and self-reliant (Reason 2); for travel, excitement and new experiences (Reason 4); and to serve my country (Reason 5). Also loading positively on this factor was enlistment to leave personal problems behind (Reason 6).

The generation of factors analogous to the four clusters lends an element of confidence to the classification of reasons for enlistment among Army enlistees as previously discussed. See Table 9 for the results of the factor analysis.

Factor I indicates that endorsement of the concept of enlistment to learn a trade or skill that will be useful in civilian life is related to the desire for advanced education or training, as well as military career opportunities, as reasons for enlistment. Other reasons

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[24] The four factors accounted for 57% of the variance.

Table 9

Factor Structure of Reasons for Enlistment: Army Enlistee Data for First Half of FY72

	Variable	I	II	III	IV
			Factors		
1.	Career opportunities in the military looked better than in civilian life.	.72	.08	-.05	.16
2.	To become more mature and self reliant.	.36	.29	.02	.51
3.	To learn a trade or skill that would be valuable in civilian life.	.75	.11	.08	.04
4.	For travel, excitement and new experiences.	.24	.26	.08	.59
5.	To serve my country (patriotism).	.36	.49	-.14	.40
6.	I wanted to leave some personal problems behind me.	-.15	-.15	.25	.69
7.	I wanted an opportunity for advanced education and training.	.79	.10	.19	.04
8.	I wanted to qualify for the G.I. Bill.	.05	.07	.81	.12
9.	The overall benefits: pay, room and board, medical care, and training.	.38	.10	.55	.20
10.	To avoid the draft.	-.41	.35	.42	-.35
11.	I wanted my choice of Service.	.17	.74	.16	-.02
12.	To fulfill my military obligation at a time of my choice.	.00	.77	.07	.13

with positive loadings on this factor are the desire to become more mature and self-reliant, patriotism, and the desire to obtain personal benefits. Enlistment to avoid the draft is negatively related to endorsing the other reasons for enlistment. Enlisting to qualify for the G.I. Bill is unrelated to this factor. This finding suggests that an advertising appeal stressing the advantages of the G.I. Bill might not be particularly productive in terms of influencing men attracted to the Army by the considerations of individual development and/or trade or skill acquisition, since the appeal of the G.I. Bill is independent of the reasons underlying this factor. In general, Factor I appears to measure career development motivation, analogous to Cluster 1.

Factor II combines endorsement of choice of branch of Service with enlistment at the time of one's choice. The desire to serve one's country (patriotism) is also included in this factor. This finding suggests an element of altruism not evident in Cluster 2 of the two hierarchical clustering solutions. Hence, Factor II appears to measure enlistment associated with personal choice and dedication. (Note the minor positive loading of draft avoidance on this factor. Another element of enlistment for temporal convenience may well include draft-motivated enlistment.)

Factor III includes enlisting for the G.I. Bill as the major variable defining the factor. Other variables with high, positive loadings on the factor include the overall

military personnel benefits (including pay), and enlistment to avoid the draft. This factor seems to measure the attraction of military personnel benefits to many enlistees. This factor may also encompass some individuals who enlisted to avoid the draft, while rationalizing their decision by the eventual benefits that would accrue from qualifying for the G.I. Bill, and from the immediate advantages of enlisting to obtain personnel benefits such as pay, room and board, medical care, and training. In general, Factor III appears to measure the attraction of military personnel benefits, analogous to Cluster 4.

Factor IV appears to measure a desire for both individual development and change, since the major loadings are enlistment for increased maturity and self-reliance; the desire for travel, excitement, and new experiences; and the desire to enlist to leave some personal problems behind. The factor seems to measure a variety of different motivations underlying the enlistment decision. On the one hand, the factor seems to reflect the desire of some young men to use the military service as a means of broadening their personalities—in the sense that travel and new experiences might result in improved self-reliance, and maturity. On the other hand, the factor seems to measure the avoidance of problems—but the nature of these problems is not known. Draft-avoidance is negatively related to this factor, and patriotism is related in a positive direction.[25] These findings suggest an element of altruism associated with this factor. In general, this factor appears to measure the desire for individual development and maturation, analogous to Cluster 3.

It is useful to compare and contrast the cluster analysis solutions and the factor analysis solutions. Each statistical approach identified a common classification in terms of four major categories of reasons for enlistment:

(1) Enlistment for career development, including an emphasis on military education and training.

(2) Enlistment for individual development and maturation, including an emphasis on travel, excitement, and new experiences that could accrue from military service.

(3) Enlistment for various military personnel benefits, including qualification for the G.I. Bill.

(4) Enlistment for personal choice, including serving at the time of one's choice in the branch of Service of one's preference (Army).

The only substantial differences shown in the various analyses concerned whether or not enlistment for military personnel benefits was draft-motivated, whether or not enlistment for time and service preference considerations was also motivated by patriotism, and whether or not enlistment for individual development purposes was also motivated by the desire to leave personal problems behind. In each case, the factor analysis indicated the existence of these associated reasons for enlistment. However, these added motives were of relatively minor importance in the definition of the respective factors, with the exception of the personal-problems reason on the individual development and change factor. Additional research suggested that this particular reason might have been "forced" into the rotated factor solution; thus, its relevance should be interpreted with caution.[26]

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[25]The negative loading of draft motivation may be interpreted as enlistment, which was not influenced by an attempt to avoid the draft.

[26]Another factor rotation of the same data suggests that this reason (enlistment to leave personal problems behind) could be considered as a separate reason. In a five-factor rotation, this reason emerged as the major loading that defined the new, fifth factor.

Second Half of FY72

The two cluster analysis algorithms of Johnson (27) were also applied to intercorrelation data from Army enlistees for the second half of FY72. Again, four major clusters of reasons for enlistment were found from the application of each algorithm. These clusters, as compared to the first half clusters, were as follows:

Cluster 1 - Same as first half of FY72 (to learn a trade or skill that would be valuable in civilian life; wanted an opportunity for advanced education and training; career opportunities in the military looked better than in civilian life).

Cluster 2 - Same as first half of FY72 (because I wanted my choice of Service; to fulfill my military obligation at a time of my choice) with the addition, in the diameter method, of enlisting to avoid the draft (Reason 10).

Cluster 3 - Same as first half of FY72 (to become more mature and self-reliant; for travel, excitement and new experiences, and to serve my country).

Cluster 4 - Same as first half of FY72 (because I wanted to qualify for the G.I. Bill; to obtain the overall benefits—pay, room and board, medical care, and training) with the addition, in the diameter method, of enlisting to leave personal problems behind (Reason 6).

The four clusters evident in the two solutions parallel those found in the first half of FY72 data. Detailed results for the clustering solutions appear in Figure 4.

As applied to the second half of FY72 data, the diameter method of clustering yielded the same four major clusters noted in each of the other cluster solutions (including the solutions for data from Army enlistees) in the first half of FY72. The diameter method as applied to the current data also yielded two new results: (a) Reason 6, "enlisting to leave personal problems behind" appeared in Cluster 4 with "qualifying for the G.I. Bill" and "over-all personnel benefits" although its relationship to these other reasons was minor; and (b) Reason 10, "enlisting to avoid the draft" appeared in Cluster 2 with "enlisting to obtain the desired choice of Service" and "to fulfill my military obligation at a time of my choice," although its relationship to the other reasons was slight.

In general, the two clustering algorithms yielded virtually identical solutions for the independent reasons from the two different time periods. This consistency of results argues for increased confidence in the basic classification of reasons for Army enlistment as noted in this research.

Intercorrelation data from Army enlistees in the second half of FY72 were next subjected to factor analysis. As with the first half of FY72 data, a four-factor orthogonal rotation showed factors that were analogous to the four clusters.[27] The four factors were:

Factor I - Same as first half of FY72 data.

Factor II - Enlisting because I wanted my choice of Service (Reason 11); and to fulfill my military obligation at a time of my choice (Reason 12). There was a substantial *positive loading* of enlistment to serve my country (Reason 5), and a substantial *negative loading* of an added item, draft-avoidance (Reason 10).

Factor III - Same as first half of FY72 data, except that draft-avoidance (Reason 10) was not included.

Factor IV - Same as first half of FY72 data, except that Reason 5, to serve my country, was not included.

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[27]The four factors accounted for 58% of the variance.

Classifications of Reasons for Enlistment: Application of Two Clustering Schemes to Army Enlistee Data for Second Half of FY72

Connectedness Method

```
                     Item Numbers
             0  1  0  0  0  0  0  0  0  0  1  1
             6  0  8  9  4  2  5  1  3  7  1  2
Solution                    Clusters
Level  Proximity    |—4—>|     |<—3—>|<——1——>|<—2—>|
  1     .50    |  |  |  |  |  |  |  |  XXX  |  |
  2     .41    |  |  |  |  |  |  |  XXXXX  |  |
  3     .40    |  |  |  |  |  |  |  XXXXX  XXX
  4     .35    |  |  |  |  |  XXX  XXXXX  XXX
  5     .34    |  |  |  |  |  XXXXXXXXX  XXX
  6     .32    |  |  |  |  |  XXXXXXXXXXXXX
  7     .31    |  |  |  |  XXXXXXXXXXXXXXX
  8     .30    |  |  XXX  XXXXXXXXXXXXXXX
  9     .29    |  |  XXXXXXXXXXXXXXXXXXX
 10     .15    |  XXXXXXXXXXXXXXXXXXXXX
 11     .11    XXXXXXXXXXXXXXXXXXXXXXX
```

Diameter Method

```
                     Item Numbers
             0  0  0  0  0  0  0  0  0  1  1  1
             4  2  5  1  3  7  6  8  9  0  1  2
Solution                    Clusters
Level  Proximity  |<—3—>|<——1——>|    |<—4—>|  |<—2—>|
  1     .50    |  |  |  |  XXX  |  |  |  |  |  |
  2     .40    |  |  |  |  XXX  |  |  |  |  XXX
  3     .40    |  |  |  XXXXX  |  |  |  |  XXX
  4     35     |  XXX  XXXXX  |  |  |  |  XXX
  5     .30    |  XXX  XXXXX  |  XXX  |  XXX
  6     .28    XXXXX  XXXXX  |  XXX  |  XXX
  7     .22    XXXXXXXXXX  |  XXX  |  XXX
  8     .15    XXXXXXXXXX  |  XXX  XXXXX
  9     .10    XXXXXXXXXX  XXXXX  XXXXX
 10    -.02    XXXXXXXXXXXXXXXX  XXXXX
 11    -.22    XXXXXXXXXXXXXXXXXXXXXXX
```

Item No.	Reasons for Enlistment
01	Career opportunities in the military looked better than in civilian life.
02	To become more mature and self reliant.
03	To learn a trade or skill that would be valuable in civilian life.
04	For travel, excitement and new experiences.
05	To serve my country.
06	I wanted to leave some personal problems behind me.
07	I wanted an opportunity for advanced education and training.
08	I wanted to qualify for the G.I. Bill.
09	The overall benefits—pay, room and board, medical care, and training.
10	To avoid the draft.
11	I wanted my choice of Service.
12	To fulfill my military obligation at a time of my choice.

Figure 4

In general, the same factors were found in this factor analysis as in the first half of FY72. Table 10 shows the findings.

Factor I reflects the same three major reasons for enlistment as noted in the first half of FY72 data: enlistment to learn a trade or skill for civilian application, for advanced education or training, or for military-career opportunities, and, to a lesser extent, the desire for increased maturity, patriotism, or military personnel benefits. Draft-motivated enlistment is inversely related to this category of enlistment motivation (this negative relationship is stronger than that noted for the first half of FY72). This factor continues to measure <u>career development motivation</u>.

Table 10

Factor Structure of Reasons for Enlistment: Army Enlistee Data for Second Half of FY72

Variable	Factors			
	I	II	III	IV
Career opportunities in the military looked better than in civilian life.	.71	.15	−.01	.08
To become more mature and self reliant.	.44	.32	.00	.41
To learn a trade or skill that would be valuable in civilian life.	.70	.14	.16	−.07
For travel, excitement and new experiences.	.29	.32	.15	.43
To serve my country (patriotism).	.46	.54	−.15	.17
I wanted to leave some personal problems behind me.	−.13	−.08	.13	.84
I wanted an opportunity for advanced education and training.	.71	.11	.28	−.04
I wanted to qualify for the G.I. Bill.	−.04	.07	.84	.07
The overall benefits: pay, room and board, medical care, and training.	.36	.10	.62	.19
To avoid the draft.	−.57	.41	.25	−.18
I wanted my choice of Service.	.14	.75	.09	.01
To fulfill my military obligation at a time of my choice.	.03	.77	.11	.03

Factor II mainly represents enlistment in the preferred Service (Army) at the time of one's choice, and also includes patriotism and draft avoidance as reasons for enlistment. Draft-avoidance is slightly more highly correlated with this factor in the solution for Army enlistees in the second half of FY72 ($r = .41$) than it was in the solution for the first half of FY72 ($r = .35$). In the current solution, Factor II seems to measure a complicated combination of motives—enlistment for personal preference involving either patriotism or draft-motivation.

Factor III is chiefly defined by enlistment to qualify for the G.I. Bill and to obtain military personnel benefits. The factor does not include a substantial loading on draft avoidance, as was noted in the first half of FY72. Instead, the factor appears to include enlistment motivation to obtain the personnel benefits package. Factor III may be termed a military personnel benefits factor.

Factor IV again represents enlistment to leave personal problems behind, while enjoying travel, excitement and new experiences and becoming more mature and self-reliant, but it does not include substantial loadings on two altruistic variables in the analogous factor for the first half of 1972—patriotism (positive) and draft avoidance (negative)—thus providing fewer complexities in interpretation. Factor IV may simply be called individual development and change.

In general, it appears that, over the period of FY72, draft motivation became either more closely associated in a positive manner with branch-of-service and temporal considerations in enlistment, or became more closely related in a negative manner with the desire for career development. Thus, draft motivation seems less related to enlistment for individual development and change, and to enlistment for obtaining military personnel benefits. It is interesting that these findings also parallel a general decline over time in the level of endorsement of draft-motivation as a specific reason for enlistment (Table 8). The findings suggest that appeals based on career development with the emphasis on training should continue to attract the type of men who are *not* draft-motivated. The findings also suggest that appeals emphasizing serving at the time of one's choice, and serving in the Army, in particular, might continue to attract some men who enlist for patriotism—possibly even some men who were previously draft-motivated individuals. Further, the findings suggest that appeals based upon personnel benefits or individual development and change can be made with confidence that such appeals are not restricted in attractiveness to draft-motivated individuals.

The reason for enlistment that showed the largest increase in endorsement over FY72 was the reason of overall personnel benefits, including pay (See Table 8). Both the factor analysis and the cluster analysis solutions suggest that this reason is more closely associated with qualifying for the G.I. Bill than it is with endorsement of the reason of military career opportunities. It would appear that the association of military personnel benefits with military career opportunities was not present in the minds of FY72 Army enlistees. Whether or not this association of military pay and careerist motivation can or should be made would appear to merit additional study, particularly in view of the continuing interest in the use of monetary incentives for recruitment and retention.

In summary, the analyses of data from Army enlistees in FY72 suggests a four-way master classification of reasons for enlistment:

    (1) Enlistment for career development, with the emphasis on education and training and presenting the opportunity of a military career.

    (2) Enlistment to serve one's country in the service of one's choice (Army), at the time of one's choice.

    (3) Enlistment to obtain military personnel benefits including pay, and to qualify for the G.I. Bill.

    (4) Enlistment for individual development and possibly change, with the emphasis on increased maturity and self-reliance obtained by exposure to travel, and new experiences.

There was general agreement on this classification for both Army samples and in both analytic methods, with the exception of the question of the advisability of including patriotism and/or the desire for change (leaving personal problems behind).

The findings suggest that one or more of these four major factors (clusters) could be used as the basis of essentially independent packaged advertising appeals designed to motivate young men to enlist in the Army. As noted previously, the consistency with which these 12 reasons for enlistment tend to cluster into the same patterns in both segments of FY72 lends strong credibility to the importance of these basic appeals as classified in this research, even continuing into the environment of the all-volunteer force.

FACTORS ASSOCIATED WITH THE DISPOSITION OF INITIAL APPLICANTS

Linear Multiple Regression

Attempts to identify factors associated with the conversion of initial applicants to enlistees for each Service achieved limited success. A total of 36 variables were subjected

to a stepwise linear multiple regression analysis (Table 6 cites the variables). The analysis was performed separately for initial applicants to each Service. The criterion consisted of enlistment into the Service to which first applied versus enlistment in another Service. Even when the majority of the variables were included in one of the stepwise equations, the resulting multiple R was observed to range no higher than .31. Table 11 specifies the magnitude of the multiple R for each Service, and the number of variables associated with the multiple R.

Table 11

Prediction of Enlistment for Initial Applicants to Each Armed Service

Service	Multiple R (Selected Predictors)	Number of Predictive Variables[a]
Army	.20	21
Navy	.31	25
Marine Corps	.21	12
Air Force	.27	27

[a]Each solution was terminated by the application of criteria governing the necessary increment in prediction to be achieved by the addition of another predictor.

The modest prediction of the conversion of applicants to enlistees through linear regression is not unanticipated, given the magnitude of the first-order correlations of each predictor variable with the criterion. Appendix F reports these intercorrelations. The distribution of the correlations ranged about zero. No intercorrelation greater than $r = .14$ was observed.

A brief description of the variables selected in the stepwise regression analysis for each Service is given below. Where necessary, the type of applicant more likely to enlist in the first Service to which he applies is indicated in parenthesis, to preclude ambiguity in interpretation.

Army Applicants. Multiple regression analysis of the conversion of initial Army applicants to Army enlistees was found to select and assign somewhat larger weights to the following variables: (a) educational level (higher educated applicants), (b) age (younger applicants), (c) race (White applicants), and (d) not being influenced to enlist by posters. Negative weights in the conversion of Army applicants to Army enlistees were also found for movies and military publications. The endorsement of certain persons as influential in the choice of Service decision was found to be negatively weighted in the prediction of Army enlistment (e.g., school counselors, a friend in the Service). Other demographic factors slightly related to Army enlistment were the prior receipt of a draft notice (negative) and following business curriculum in high school (negative). Aptitude (AFQT) was a positive factor, although AFQT category was related negatively because of the coding convention, that is, Mental Category IVs were less likely to become Army enlistees than men in the higher mental ability groups. Among the reasons for enlistment, endorsement of serving at the time of one's choice was accorded a positive weight in the

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prediction of Army enlistment, while enlisting for choice of Service, patriotism, and for military career opportunities were assigned negative weights. See Table 12 for the details.

Table 12

Disposition of Initial Army Applicants:
Application of Stepwise Linear Multiple Regression

Variables Selected	Beta	Sigma (Beta)	F-Ratio
Career Opportunities	-.04	.01	13.1
Patriotism	-.03	.01	7.9
G.I. Bill	-.02	.01	3.1
Benefits	.02	.01	4.6
Choice of Service	-.04	.01	14.0
Time of Choice	.04	.01	12.3
Trade School	-.02	.01	2.5
Received Draft Notice	-.04	.01	12.8
Age	-.08	.01	54.7
Educational Level	.09	.01	62.9
Marital Status	.02	.01	2.6
Race	.06	.01	35.0
AFQT Category	-.02	.01	2.8
HS Study—Business	-.04	.01	14.1
Infl Person—Recruiter	-.02	.01	2.1
Infl Person—Relative	-.03	.01	5.4
Infl Person—Friend in Service	-.05	.01	14.4
Infl Person—Counselor	-.04	.01	13.4
Infl Media—Publications	-.03	.01	5.7
Infl Media—Posters	-.06	.01	37.0
Infl Media—Movies	-.02	.01	2.0

Navy Applicants. Multiple regression analysis of the conversion of initial Navy applicants to Navy enlistees was found to select and assign somewhat larger weights to the following variables: (a) educational level (higher educated applicants), (b) endorsement of choice of Service as influencing enlistment (positive), (c) endorsing qualification for the G.I. Bill as influencing enlistment (negative), (d) AFQT category (higher aptitude applicants), and (e) marital status (single). Persons influential in the choice of the Navy were found to be a parent or relative (positive weight) or a recruiter (negative weight). Prior receipt of a draft notice was negatively related to Navy enlistment. Among the reasons for enlistment, positive weights were accorded the endorsement of learning a trade or skill useful in civilian life, and enlistment for travel, excitement and new experiences (as well as "choice of Service" noted above). Negative weights were accorded the report of enlistment for increased maturity, draft avoidance, leaving personal problems behind, and enlisting at the time of one's choice (as well as enlisting "to qualify for the G.I. Bill" as noted above). Table 13 cites the details.

Marine Corps Applicants. Multiple regression analysis of the conversion of initial Marine Corps applicants to Marine Corps enlistees was found to select and assign somewhat larger weights to the following variables: (a) age (younger applicants), (b) endorsement of choice of Service as influencing enlistment (positive), and (c) enlisting for military career opportunities (negative). Influential media assigned positive weights in

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Table 13

Disposition of Initial Navy Applicants:
Application of Stepwise Linear Multiple Regression

Variables Selected	Beta	Sigma(Beta)	F-Ratio
Maturity	-.04	.01	10.8
Trade/Skill	.04	.01	13.2
Travel/Excitement	.06	.01	21.7
Personal Problems	-.06	.01	22.2
G.I. Bill	-.07	.01	40.5
Avoid Draft	-.03	.01	7.9
Choice of Service	.11	.01	71.5
Time of Choice	-.05	.01	14.7
Trade School	-.03	.01	8.9
Received Draft Notice	-.05	.01	19.1
Age	-.04	.01	10.0
Educational Level	.12	.01	85.9
Marital Status	-.06	.01	29.0
Race	.02	.01	1.9
AFQT Category	-.08	.01	37.9
HS Study—Academic	.03	.01	5.9
HS Study—Business	-.04	.01	11.4
HS Study—Other	-.08	.01	42.8
Infl Person—Recruiter	-.05	.01	15.5
Infl Person—Relative	.05	.01	14.3
Infl Person—Friend in Service	.03	.01	5.3
Infl Media—Newspaper	-.02	.01	3.2
Infl Media—Posters	.02	.01	2.1
Infl Media—Movies	.02	.01	3.9
Working Before Enlist	.02	.01	3.2

Marine Corps enlistment included movies, posters, and military publications. AFQT category (higher aptitude) and race (White applicants) were slightly related to Marine Corps enlistment. Among reasons for enlistment, endorsement of enlisting for advanced education or training, and enlisting for travel, excitement and new experiences were accorded negative weights (as was enlisting for "military career opportunities" noted above), while enlisting for increased maturity and self-reliance was accorded a positive weight. Results are given in Table 14.

Air Force Applicants. Multiple regression analysis of the conversion of initial Air Force applicants to Air Force enlistees was found to select and assign somewhat larger weights to the following variables: (a) endorsement of choice of Service as influencing enlistment (positive), (b) race (White), (c) AFQT category (higher aptitude applicant), and (d) educational level (higher educated applicants). Personal influences related to Air Force enlistment that were accorded positive weights were—a friend in the Service and a parent or relatives. Demographic factors related to Air Force enlistment were the prior receipt of a draft notice (negative), trade school attendance (negative), age (younger applicants), and marital status (single). Among the reasons for enlistment, endorsements of the following

Table 14

Disposition of Initial Marine Corps Applicants: Application of Stepwise Linear Multiple Regression

Variables Selected	Beta	Sigma(Beta)	F-Ratio
Career Opportunities	-.07	.02	14.6
Maturity	.04	.02	5.7
Travel/Excitement	-.04	.02	5.0
Advanced Education	-.04	.02	4.0
Choice of Service	.09	.02	22.5
Age	-.09	.02	22.7
Race	.04	.02	3.9
AFQT Category	-.06	.02	11.9
Infl Person—Relative	-.03	.02	3.4
Infl Media—Publications	.04	.02	4.8
Infl Media—Posters	.06	.02	8.9
Infl Media—Movies	.06	.02	9.8

Table 15

Disposition of Initial Air Force Applicants: Application of Stepwise Linear Multiple Regression

Variables Selected	Beta	Sigma(Beta)	F-Ratio
Career Opportunities	.03	.01	6.0
Maturity	-.04	.01	9.4
Trade/Skill	.02	.01	1.9
Travel/Excitement	-.05	.01	14.7
Patriotism	-.07	.01	22.4
Personal Problems	-.03	.01	7.3
Advanced Education	.06	.01	16.2
G.I. Bill	-.06	.01	22.2
Benefits	.02	.01	2.4
Choice of Service	.13	.01	91.5
Time of Choice	-.03	.01	5.6
Trade School	-.03	.01	4.4
Received Draft Notice	-.04	.01	10.4
Age	-.03	.01	5.4
Educational Level	.07	.01	22.2
Marital Status	-.02	.01	2.6
Race	.09	.01	42.7
AFQT Category	-.07	.01	28.4
HS Study—Academic	.02	.01	1.9
HS Study—Other	-.02	.01	1.7

———————(Continued)———————

Table 15 (Continued)

Disposition of Initial Air Force Applicants:
Application of Stepwise Linear Multiple Regression

Variables Selected	Beta	Sigma (Beta)	F-Ratio
Infl Person—Relative	.05	.01	12.8
Infl Person—Friend in Service	.06	.01	21.2
Infl Person—Counselor	.02	.01	3.3
Infl Media—Radio	-.02	.01	2.5
Infl Media—Magazines	.02	.01	3.4
Infl Media—Publications	.04	.01	9.0
Working Before Enlist	.03	.01	5.1

reasons were assigned positive weights in the prediction of Air Force enlistment: (a) the opportunity for advanced education or training; (b) military career opportunities; (c) overall personnel benefits; and (d) to learn a trade or skill useful in civilian life (as well as "choice of Service" as noted above). Reasons for enlistment assigned negative weights included the following: (a) patriotism; (b) G.I. Bill; (c) travel, excitement, and new experiences; (d) increased maturity and self-reliance; (e) serving at the time of one's choice; and (e) enlistment to leave personal problems behind. See Table 15 for the details.

For each Service, there were indications that the conversion of one's initial applicants into enlistees was a function of certain, common variables: (a) age (younger applicants), (b) AFQT category (higher aptitude applicants), (c) race (White applicants), and, with the exception of Marine Corps applicants, (d) educational level (higher educated applicants); and (e) marital status (single). These results suggest that the enlistment of one's own applicants may be related to both aptitude and ability (AFQT, education) as well as to other factors such as age, race, and marital status. Even when aptitude and education are taken into account, some amount of independent variance in the prediction of the conversion of applicants to enlistees was still attributed to race. Age and marital status appeared to be related to enlistment, with the younger, unmarried applicant more likely to be enlisted by the first Service to which he applies than the older, married applicant.

Automatic Interaction Detection (AID)

Attempts to identify factors associated with the enlistment disposition of initial applicants to each Service, using linear multiple regression, received only limited success, but did serve to identify several common factors operative in the process for each Service. The automatic interaction detection (AID) technique also was applied to the same variables to determine whether the more flexible AID approach [28] would identify the same factors as related to the disposition of initial applicants, that is, age, education, aptitude, race, and marital status. It was also hoped that the application of AID would clarify relationships between the various factors and the criterion. Specifically, it was desirable to determine whether the AID technique would identify *interactions* in the data that did not appear in the linear multiple regression formulation of the problem.

[28]The AID approach does not assume linearity in the relationship of predictor variables to the criterion, whereas linear multiple regression requires this assumption.

Army Applicants. The major factor related to the enlistment disposition of Army applicants was educational level. The Army enlisted men with high school diplomas (or above) at a higher rate (94%) than they enrolled men who were non-high school graduates (87%). Controlling on education, race was an operative factor. The Army enlisted White applicants at a higher rate than they enlisted initial applicants who were other than White. The difference was more pronounced for non-high school graduates (90%, White; 82%, other) than it was for high school graduates or above (94%, White; 90%, other).[29]

The identification of factors other than education and race proved complex and idiosyncratic, that is, results varied by race and education level. However. aptitude (AFQT category) was not a variable identified in the AID analysis for Army applicants, nor was marital status. Age was noted as a factor in the disposition of Army applicants, with the younger applicant more likely to become an Army enlistee—but the age variable was not a primary factor in the solution.[30]

Among the various media presented, the endorsement of "posters" as the most influential medium was generally related to a lower probability of Army enlistment of initial Army applicants, while the endorsement of television and newspapers (or none of these media) was related to a higher probability of Army enlistment among initial Army applicants.

Among the various reasons for enlistment, Army applicants who endorse choice of Service as a strong influence (or no influence) were less likely to enlist in the Army—although this finding was noted only for White, non-high school graduates. Army applicants who attributed strong influence to enlistment because of the opportunity for advanced education and training were slightly less likely to enlist in the Army than applicants not endorsing this reason. This finding held for White, high school graduates (or above). Endorsement of draft-avoidance as a strong influence (or no influence) in the enlistment decision was positively related to Army enlistment for White non-high school graduates. See Appendix G for detailed findings.

Figure 5 presen ; details of the relationships of each variable to Army enlistment, and the interactions between the variables.

Navy Applicants. The major factor related to the enlistment of Navy applicants was educational level. The Navy enlisted men with high school degrees and some college exposure at a higher rate (84%) than those with extremes in education, that is, either a college degree or non-high school graduates (64%). Among applicants with high school diplomas or some college, the Navy appeared to have selected on aptitude and, additionally, on age. Among this group, Mental Category I or II applicants were more likely to become Navy enlistees (90%) than were Mental Category III or IV applicants (81%). Endorsement of choice of Service was the primary factor differentiating the non-high school graduate or college graduate group. Among this group, applicants who attributed strong influence to choice of Service were enlisted into the Navy at a higher rate (69%) than were men who attributed no influence or some influence to choice of Service (58%).

Among the various types of persons who influenced the branch of Service decision, positive influence in Navy enlistment was indicated for family or relatives, a friend in the Service, and school counselors, but not to the recruiter.

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[29] This finding implies an interaction between education and race in the disposition of Army applicants. Army enlistment was much more likely to occur for white, high school graduates than for non-white, non high school graduates. The rate for non-white high school graduates was virtually identical with the enlistment rate for white non-high school graduates.

[30] The findings on age were complex and variable, because of the small number of cases in each age category after earlier AID "shredding" on variables such as education and race.

Major Factors in the Enlistment Disposition of Initial Applicants to the Army
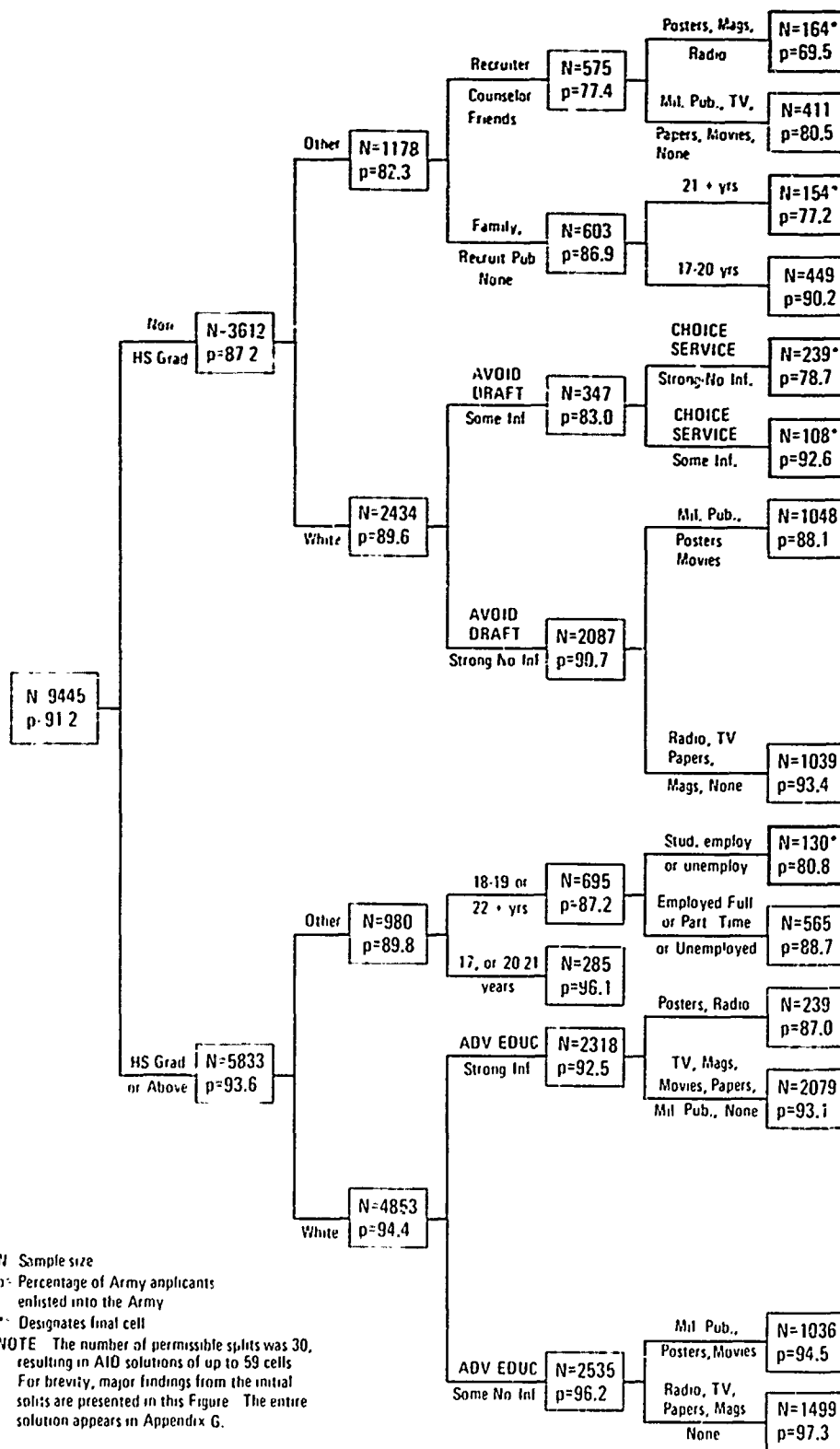
N Sample size
p Percentage of Army applicants enlisted into the Army
** Designates final cell

NOTE The number of permissible splits was 30, resulting in AID solutions of up to 59 cells. For brevity, major findings from the initial splits are presented in this Figure. The entire solution appears in Appendix G.

Figure 5

Among the various reasons for enlistment, the attribution of strong influence to enlisting for choice of Service and because of military career opportunities was related in a positive direction to Navy enlistment as noted above. However, negative relationships were found for Navy enlistment of Navy applicants who attributed strong influence (or no influence) to enlistment for personnel benefits or strong influence to enlistment to qualify for the G.I. Bill.

Since the majority of these factors operated selectively for subgroups of Navy applicants, Figure 6 should be studied to evaluate the relative generality or specificity of the findings. Also see Appendix G for detailed findings.

Marine Corps Applicants. The major factor related to the decision to enlist in the Marine Corps was aptitude as determined by AFQT mental category. The Marine Corps enlisted men in Mental Category II or III more frequently (88%) than they enlisted those in Categories I or IV (77%). An interaction was noted between age and aptitude. Among men in Mental Groups II and III, applicants whose ages were between 17 and 21 years were more likely to enlist (89%) in the Marine Corps than were those who were older (78%).

A more complex age relationship held among Mental Groups I and IV. Among these men, applicants whose ages were between 18 and 20 years were more likely to become Marines (81%) than were those applicants who were either 17 years of age or 21 years or older (68%). (Race was related to enlistment among 18- to 20-year-old applicants in Mental Categories I or IV, with more White applicants, 82%, enlisting in the Marine Corps than non-Whites, 70%.) Also, Marine Corps applicants 18 to 20 years of age who attributed little or no influence to the "opportunity for an advanced education" as a factor in their enlistment decision, enlisted at a higher rate (88%) than did applicants who attributed a strong influence to this reason for enlistment (77%).

All subsequent comments will refer to findings for the majority of Marine Corps applicants derived from the 2,571 cases of those applicants in Mental Categories II and III. Among the applicants, those who attributed strong influence (or some influence) in their enlistment decision to the opportunity to select their choice of Service were more likely to enlist in the Marine Corps than were those applicants who did not attribute strong influence to this reason. A lower percentage of eventual Marine Corps enlistees cited the opportunity for advanced education or military career opportunities as strong influences in their enlistment decision than did those applicants who attributed some or no influence to these reasons for enlistment. Figure 7 shows the major results of this analysis. See Appendix G for detailed findings.

Air Force Applicants. Aptitude, as determined by AFQT category, was the major factor related to subsequent Air Force enlistment by men who initially applied to the Air Force. The Air Force enlisted a higher percentage of applicants from Mental Categories I, II, and III (88%) than from Category IV (72%). There is a strong age by aptitude interaction among Air Force applicants. Applicants in Mental Groups I - III who were 18-21 years of age were more likely to be enlisted in the Air Force (90%) than were applicants at the extremes of the age ranges (17 years or 22 years and older, 80%). This relationship between age and aptitude also holds for applicants in Mental Category IV, with 76% of applicants converted into Air Force enlistees in the age group of 18-20 years, compared to a 58% conversion rate for applicants in the extremes of the age ranges. For men in the intermediate age range, race was a factor in that the Air Force also enlisted proportionately more White applicants than non-White applicants.

Another demographic factor related to Air Force enlistment was educational level (high school graduate or beyond in educational achievement). Employment status—employed full-time, employed student, or unemployed student—and prior receipt of draft notice (had not received draft notice prior to enlistment) were also related to enlistment. (See Appendix G for details.)

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Major Factors in the Enlistment Disposition of Initial Applicants to the Navy

Figure 6

N = Sample size
p = Percentage of USN applicants
   enlisted into the Navy
* = Designates final cell
NOTE The number of permissible splits was 30,
   resulting in AID solutions of up to 59 cells
   For brevity, major findings from the initial
   splits are presented in this Figure The entire
   solution appears in Appendix G.

Major Factors in the Enlistment Disposition of Initial Applicants
to the Marine Corps

```
                                              17 or 21 +   N=177*
                                              years        p=68.4
                              MG    N=580
                              I, IV p=77.1
                                              18 - 20      N=403      ADV EDUC    N=252     Other     N=109*
                                              years        p=80.9     Strong Inf. p=76.6              p=69.7
                                                                                            White     N=143*
                                                                                                      p=81.8
                                                                      ADV EDUC    N=151*
                                                                      Some-No Inf. p=88.1

N=3151
p=86.1
                                              22 + yrs.    N=260      TV, Posters, Mags   N=108*
                                                           p=77.7     None                p=69.4

                                                                      Papers, Radio,      N=152*   19 - 20 years   N=349
                                                                      Movies, Mil. Pub.   p=83.6                   p=82.5

                              MG    N=2571                            CAREER OPP  N=925
                              II, III p=88.1                          Strong Inf. p=86.3

                                                                                          17 - 18, 21 yrs   N=576
                                                                                                            p=88.5

                                              21 yrs or    N=2311
                                              younger      p=89.3
                                                                                          CHOICE
                                                                                          SERVICE    N=154*
                                                                                          No Inf.    p=81.8

                                                                      CAREER OPP  N=1386
                                                                      Some - No Inf. p=91.3

                                                                                          CHOICE
                                                                                          SERVICE         N=1232
                                                                                          Strong-Some Inf. p=92.5
```

N = Sample size
p = Percentage of USMC applicants
enlisted into the Marine Corps
* = Designates final cell
NOTE: The number of permissible splits was 30,
resulting in AID solutions of up to 59 cells.
For brevity, major findings from the initial
splits are presented in this Figure. The entire
solution appears in Appendix G.

Figure 7

Air Force applicants who enlisted in the Air Force rated <u>choice of Service</u> as strongly influential in their enlistment decision more often than Air Force applicants who enlisted in another Service. Conversely, patriotism and the chance to become more mature and self-reliant were reasons accorded no influence or only some influence in the enlistment decision by the Air Force applicants. Another reason that was found to have a positive relationship to eventual Air Force enlistment was the opportunity for advanced education. See Figure 8 for the major results of this analysis.

In summary, the AID analysis identified certain demographic variables as major factors in the disposition of initial applicants by the Armed Services in FY72. The major factors influencing Army enlistment were the educational level and race of the applicant. The interaction between these variables was such that initial Army applicants who were White and high school graduates were more likely to be enlisted into the Army (94%) than applicants who were non-White and non-high school graduates (82%). The analysis also showed that non-White high school graduates had the same conversion (Army enlistment) rate as White applicants who were non-high school graduates (90%).

An additional analysis was performed of the results for an important subgroup—highly qualified, initial applicants to the Army who showed lower rates of Army enlistment. Such men are valuable Army applicants, many of whom are "lost" to the other Services. Analysis of the characteristics of these applicants (all White, high school graduates or above) showed the following:

    (1) They were more likely to attribute strong influence to enlistment as according an opportunity for advanced education and training.

    (2) They were slightly older.

    (3) They were more likely to have attended trade school.

These results suggest that a recruitment strategy should be designed and implemented to attempt to increase the rate of enlistment of these well qualified applicants. One possible strategy might be to emphasize the ample opportunities for advanced training in the Army, since these applicants appear more oriented toward employment, that is, they may be attempting to increase their future earning power by obtaining training for a trade or profession in the Armed Services. Given the variety of available Army training and education experiences, and given the earlier finding that "career development" comprises a major factor (cluster) of reasons for enlistment, Army efforts to improve both the numbers of initial applicants and the rates of acquisition of qualified initial applicants would appear to be well-served by a continuing emphasis on Army training and educational opportunities in Army recruitment and advertising.

Comparison of AID and Multiple Regression Solutions

For each Service, the AID and multiple regression solutions tended to identify demographic characteristics as more highly related to the disposition of initial applicants for enlistment than factors such as influential persons, media, and the structured reasons for enlistment endorsed by the applicant. (However, the endorsement of a reason such as choice of Service was a major factor in the acquisition of Marine Corps and Air Force applicants by these Services.)

In general, both techniques identified the same demographic factors as related to the enlistment disposition of initial applicants. Both identified education as the major factor in the Army and Navy solutions. Aptitude (AFQT) was the major factor in the Marine Corps and Air Force AID solutions, and one of the more important factors in the multiple regression solutions.

The AID technique tended to identify certain interesting interactions in the relationship of key demographic variables to the enlistment of initial applicants. For example, age and aptitude interactions were found for the Marine Corps and the Air Force, and for
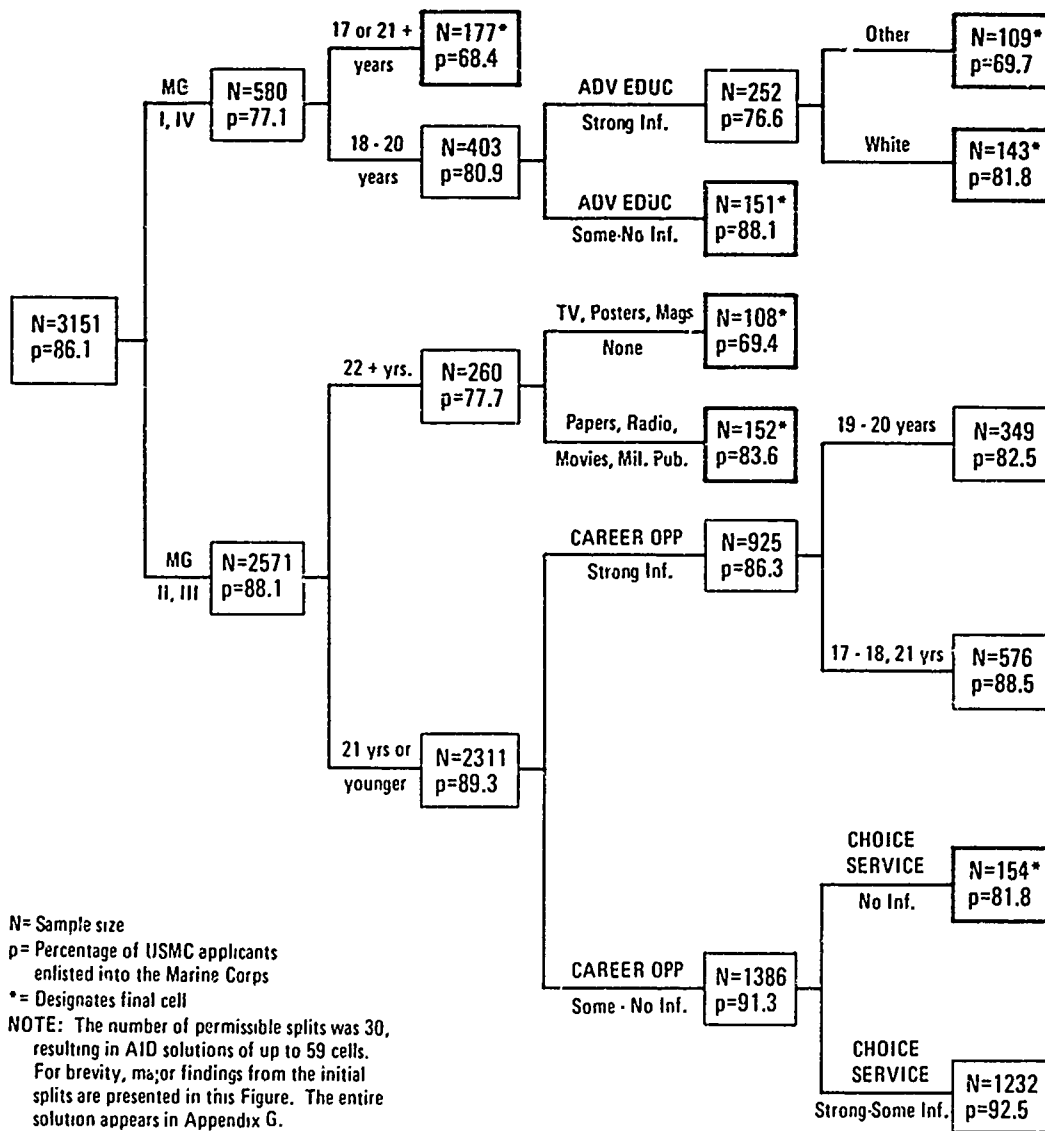
Major Factors in the Enlistment Disposition of Initial Applicants to the Air Force


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                                                                    Mil. Pub., Radio,  ┌─────────┐
                                                                    Papers, Movies,    │ N=146*  │
                                            17 or 21 + ┌─────────┐   Other  ┌────────┐  None      │ p=65.8  │
                                               yrs     │ N=129*  │          │ N=247  │            └─────────┘
                              MG IV ┌────────┐         │ p=58.1  │          │ p=70.9 │   TV, Posters,  ┌─────────┐
                                    │ N=631  │         └─────────┘          └────────┘   Mags        │ N=101*  │
                                    │ p=72.1 │  18-20 yrs ┌────────┐                                  │ p=78.2  │
                                    └────────┘           │ N=502  │                                  └─────────┘
                                                         │ p=75.7 │                  MATURITY      ┌─────────┐
                                                         └────────┘   White ┌────────┐ Strong-No Inf. │ N=149*  │
                                                                            │ N=255  │             │ p=74.5  │
                                                                            │ p=80.4 │  MATURITY   └─────────┘
                                                                            └────────┘  Some Inf.  ┌─────────┐
                                                                                                   │ N=106*  │
                                                                                                   │ p=88.7  │
                                                                                                   └─────────┘
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N= Sample size
p= Percentage of USAF applicants enlisted into the Air Force
* = Designates final cell
NOTE: The number of permissible splits was 30, resulting in AID solutions of up to 59 cells. For brevity, major findings from the initial splits are presented in this Figure. The entire solution appears in Appendix G.
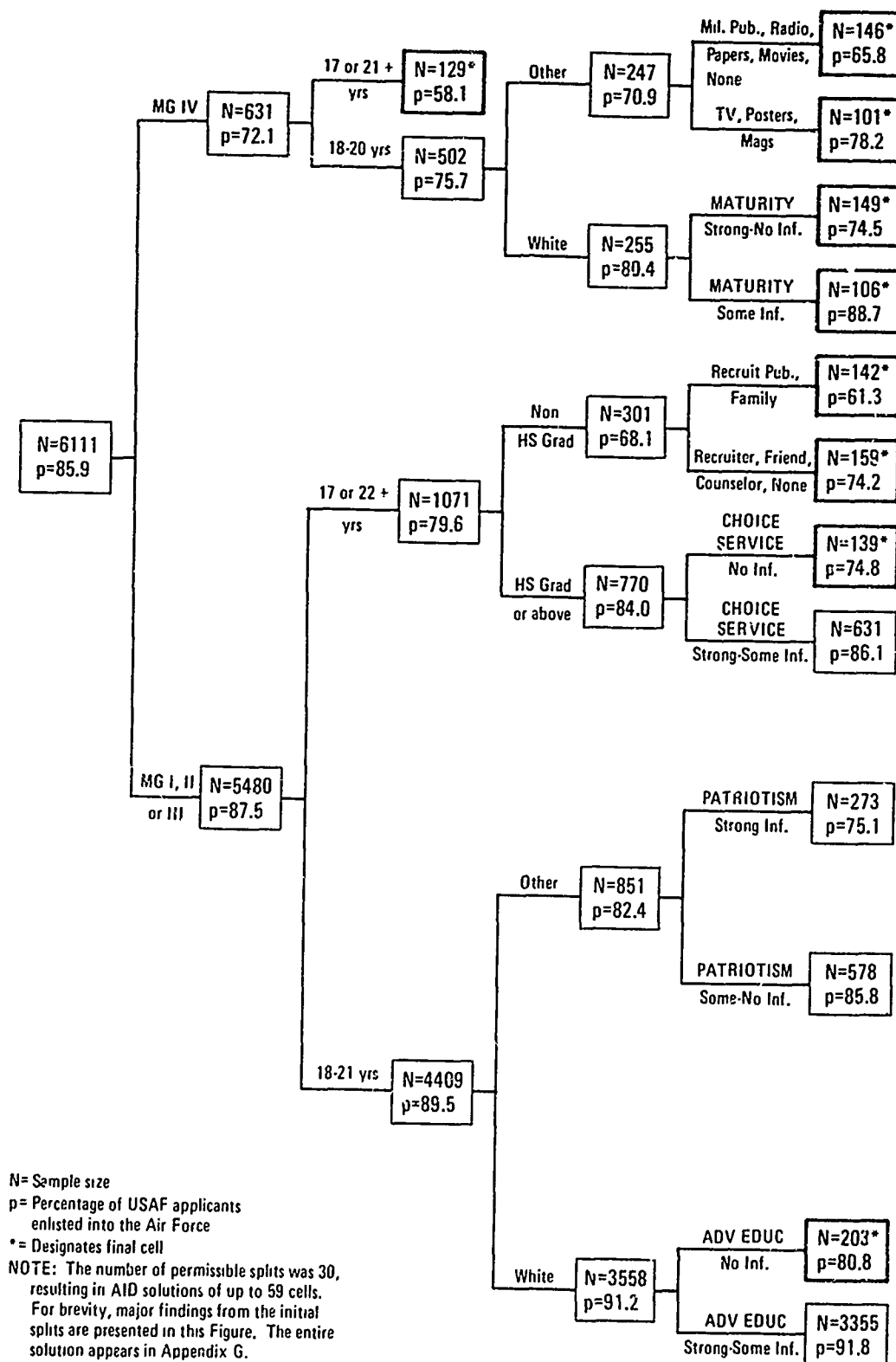
Figure 8

the Army an interaction was found for educational attainment and race. In identifying these interactions, the AID technique tended to be slightly more parsimonious than linear multiple regression in indicating demographic variables operative in the disposition of initial applicants. For example, the AID application to Army applicant data identified the education and race interaction, while multiple regression selected age and AFQT as well as education and race as pertinent variables.

ADDITIONAL FINDINGS

THE DYNAMICS OF ARMY ENLISTED MANPOWER ACQUISITION

This report has addressed one aspect of Army enlistment, that is, the disposition of initial applicants to the Army, where the sample of applicants was restricted to men of sufficient motivation and qualifications to be enlisted in one of the Armed Services. The objective was to identify factors associated with the enlistment of these men into the Army or into another Service, since decreasing the loss of qualified initial Army applicants to the other Services would serve to increase the "return" on Army investment in advertising and recruitment efforts to attract these applicants to the Army.

However, the successful enlistment of initial Army applicants is only one facet of the total Army enlisted manpower acquisition process. The purpose of this section is to present certain data that permit the reader to develop a perspective on the importance of enlistment of initial Army applicants in contrast to the enlistment of men from another source, such as initial applicants to the other Armed Services who do not enlist in these Services. In particular, these findings will indicate that both the quantity and quality of this latter source is important in the achievement of Army quotas for enlisted manpower.

Quantitative Considerations

Using the FY72 AFEES sample survey data analyzed in this report, it was possible to generate a matrix of data illustrating the net gains and losses of manpower to the Army from Army applicants and applicants to other Services.[31] Table 16 indicates that the Army "gained" 1,552 men from initial applicants to the other Services, while "losing" to the other Services only 834 initial Army applicants.

Table 16

Quantitative Aspects of Army Enlistment
(Base: FY72 AFEES Sample Data)

	Army Enlistees	Enlistees to Other Services	Total
Initial Army Applicants	8,611	834	9,445
Initial Applicants to Other Services	1,552	14,881	16,433
Total	10,163	15,715	25,878

[31] See Appendix A for the source data.

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Army enlistment of initial applicants to the other Services constituted 1,552 men of the total Army enlistee pool of 10,163 (15%) in the sample. This finding suggests that Army enlistment of initial applicants to the other Services was a very important factor in the accommodation of Army quotas in FY72.[32]

Qualitative Considerations

Further analyses of the FY72 AFEES sample survey data indicated that the Army also realized a net gain in the quality of manpower "gained" from the pool of initial applicants to the other Services, compared to the quality of initial Army applicants "lost" (or rejected) by the Army who subsequently enlisted in one of the other Services. These data provide a comparison of the quality of men "gained" by the Army or "lost" to the Army, where *quality* is inferred from educational attainment and tested aptitude (AFQT).

Table 17 indicates that men gained (enlisted) by the Army from the pool of initial applicants to the other Services possess a higher percentage of high school graduates and a slightly higher percentage of Mental Category I or II personnel than do initial Army applicants who subsequently enlist in one of the other Services.

Table 17

Qualitative Aspects of Army Enlistment:
A Comparison of Education and Aptitude for Men Gained and Lost
(Base: Selected FY72 AFEES Sample Data)

Education Category	Educational Attainment				AFQT Mental Category	Tested Aptitude (AFQT)			
	Gains From Other Services		Losses to Other Services			Gains From Other Services		Losses to Other Services	
	N	%	N	%		N	%	N	%
HS Graduate or above	861	55	372	45	I or II	360	23	172	21
					III	870	56	483	58
Non-HS Graduate	691	45	462	55	IV	322	21	179	22
Total	1,552	100	834	100	Total	1,552	100	834	101

Table 18 indicates the racial composition of "gains" and "losses." A higher percentage of Whites were present among men gained (enlisted) by the Army from the pool of initial applicants to the other Services than was evident in the group of initial Army applicants who subsequently enlisted in one of the other Services.

In summary, these analyses indicate that the Army acquires a substantial number of qualified men from the pool of initial applicants to the other Services. The results argue for the development and implementation of Army advertising and recruiting strategies geared to attract and enlist applicants not enlisted by the other Services.

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[32] Preliminary inspection of population data from the first half of FY73 indicates that the same phenomenon continued to apply.

Table 18

Qualitative Aspects of Army Enlistment:
A Comparison of the Racial Composition of
Men Gained and Lost
(Base: Selected FY72 AFEES Sample Data)

Racial Category	Gains From Other Services		Losses to Other Services	
	N	%	N	%
White	1,125	72.5	525	62.9
Other	427	27.5	309	37.1
Total	1,552	100.0	834	100.0

THE ATTRACTION OF INITIAL APPLICANTS TO OTHER SERVICES

One approach to attracting initial applicants to the Armed Services other than the Army is to exploit their stated reasons for enlistment. Reasons for enlistment that are influential to these applicants include patriotism (enlisting to serve my country) and the opportunity for advanced education and training.

An AID analysis was performed on the sample of 10,163 FY72 Army enlistees, differentiated into initial Army applicants and initial applicants to another Service. The analysis was designed to identify factors associated with initial Army application as opposed to initial application to another Service. The same 23 variables used in the previous AID analyses were used in this research. Figure 9 presents selected findings for this analysis.

Major Factors Differentiating Army Enlistees Into Army Applicants and
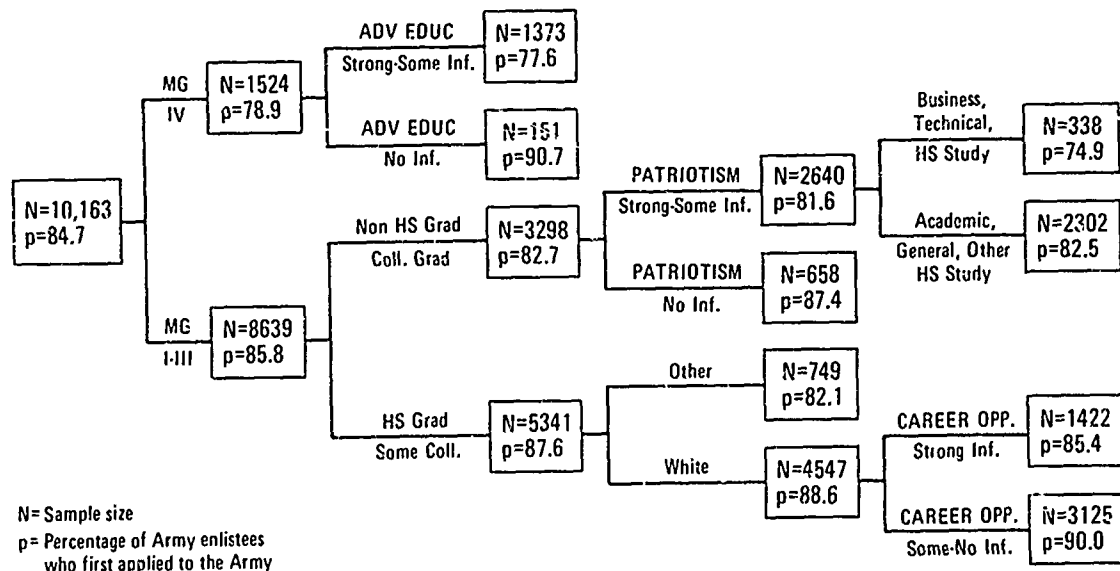   Applicants to Other Armed Services
    (Major Factors Only)

N= Sample size
p= Percentage of Army enlistees
    who first applied to the Army

Figure 9

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Figure 9 indicates that initial applicants to other Services who were enlisted into the Army were more likely to attribute influence (strong influence or some influence) to enlistment for advanced education and training (see Mental Category IV branch) and enlistment for patriotism (see Mental Category I-III branch, than were initial Army applicants. Since the Army enlists a substantial percentage of initial applicants to the Navy and Air Force, the former finding is not unanticipated. The fact that a substantial percentage of Army enlistees are initial applicants to the Marine Corps may explain the latter finding. Additional research should be performed to evaluate these hypotheses. In lieu of the performance of such research, it is still important to note that these particular themes appear to be related to the enlistment of initial applicants to the other Services.

The major factor that distinguishes between initial Army applicants and initial applicants to other Services is AFQT category. This finding reflects the fact that the other Services "screen" their applicants on aptitude (Figure 7 and Figure 8). However, in spite of this selection of applicants by the other Services, it has been noted that the men from this pool who become available to the Army for enlistment (potential gains) still possess superior qualifications when compared to initial Army applicants lost (or rejected) to the other Services (Table 17). Hence, this group is an important source of Army enlistees, and exploitation of appeals such as patriotism and the opportunity for advanced education and training offer promise in the development of strategies to enlist these men into the Army. However, it should be noted that "opportunity for advanced education and training" was found to be a slight negative factor in the enlistment of qualified initial Army applicants (Figure 5). Hence, this reason for enlistment may require skillful use in recruitment if it is to improve the enlistment of both initial Army applicants and initial applicants to other Services.

Thus, the Army seems to "lose" men motivated by this reason to the other Services, but to attract ("gain") and enlist initial applicants to the other Services who are strongly motivated by the opportunity for advanced education and training.

INCREASING THE NUMBER OF INITIAL ARMY APPLICANTS

In an ideal recruiting climate, the Army would attract sufficient quantities of initial applicants to permit rigorous selection, and could then afford to reduce its rate of enlistment of these applicants below the figure of approximately 90% reported in this study. In this ideal situation, the Army could be increasingly selective in the decision to enlist initial applicants to the other Armed Services, and there would be less need to rely upon referrals from the other Services for potential enlistees.

While estimates of the feasibility of markedly increasing the size of the pool of initial Army applicants are beyond the scope of this report, the importance of this effort cannot be overemphasized. This conclusion derives from the quality of initial Army applicants, relative to the quality of men gained from the pool of initial applicants to the other Services who eventually enlist in the Army. Previous analyses (Table 17) have shown that, relative to initial Army applicants lost (or rejected) to the other Services, the quality of gains to the Army from the pool of initial applicants to the other Services is superior. However, the quality of such gains is *inferior* to the quality of initial Army applicants in total, as well as being inferior to the quality of the initial Army applicant who is enlisted into the Army. Table 19 presents detailed results on the quality of Army applicants.

Comparing Table 19 with Table 17, it is seen that the percentage of high school graduates among total initial Army applicants (62%) is higher than among men gained from other Services (55%). Further, this comparison indicates that the percentage of Mental Category I or II individuals in this pool of initial Army applicants (29%) is higher

Table 19

**Qualitative Assessment of Initial Army Applicants:
Total Applicants and Applicants Enlisted In the Army**
(Base: Selected FY72 AFEES Sample Data)

Category	Total Army Applicants		Initial Army Applicants Enlisted Into the Army	
	N	%	N	%
Education				
HS Graduate or above	5,833	62	5,461	63
Non-HS Graduate	3,612	38	3,150	37
Total	9,445	100	8,611	100
AFQT Mental Category				
I or II	2,751	29	2,579	30
III	5,313	56	4,830	56
IV	1,381	15	1,202	14
Total	9,445	100	8,611	100
Race				
White	7,287	77	6,762	78
Other	2,158	23	1,849	22
Total	9,445	100	8,611	100

than among men gained by the Army from initial applicants to other Services (23%). These differences are even more pronounced when the quality of "gains" and the quality of initial Army applicants who enlist in the Army are compared.

For this reason, the Army should attempt to increase the quality of initial Army applicants, given the feasibility of this effort. If this goal is attained, then the Army may be able to enlist sufficient numbers of its own applicants without recourse to the enlistment of referrals from the other Services. If the goal of increasing the pool of initial Army applicants is *not* met, then the two recruitment strategies noted in this report may need to be implemented. Thus, the Army may need to develop advertising and recruiting strategies designed to (a) reduce the losses of qualified men from the initial Army applicant pool, as well as (b) attract and enlist qualified men who first apply to the other Armed Services, but who are not enlisted by these Services. The findings of research presented in this report may assist in meeting these two objectives.

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APPENDICES

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Appendix A

DISPOSITION OF INITIAL APPLICANTS FOR ENLISTMENT

Table A-1

Source Data for FY72 Conversion Rates

First Service Applied to	Service in Which Enlisted			
	Army	Navy	Marine Corps	Air Force
ARMY (N=9,445)	8611	297	338	199
NAVY (N=7,171)	841	5628	348	354
USMC (N=3,151)	267	98	2712	74
USAF (N=6,111)	444	253	162	5252

Table A-2

Transition Probabilities Based on FY72 Conversion Rates

(Percentage)

First Service Applied to	Service in Which Enlisted				
	Army	Navy	Marine Corps	Air Force	
ARMY (N=9,445)	91.2	3.1	3.6	2.1	⟶ 100%
Navy (N=7,171)	11.7	78.5	4.9	4.9	
USMC (N=3,151)	8.5	3.1	86.1	2.3	
USAF (N=6,111)	7.3	4.1	2.7	85.9	

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Appendix B

ARMED FORCES ENTRANCE AND EXAMINATION STATIONS (AFEES)
SURVEY QUESTIONNAIRE

MARCH 1971	DEPARTMENT OF DEFENSE SURVEY OF MALE PERSONNEL ENTERING THE SERVICE THROUGH ENLISTMENT	REPORTS CONTROL SYMBOL OSD-(OT)-1572

BACKGROUND

The Department of Defense is studying the attitudes and opinions of enlisted men in all the services on several subjects. In order to provide the Defense Department with meaningful data from the enlisted men themselves, you are requested to complete this survey. Your cooperation in completing this questionnaire as fully and accurately as possible will be greatly appreciated.

We are not interested in identifying any particular individual who answers this questionnaire. Your answers will be treated in confidence, and will not become part of your military record or commit you in any way.

GENERAL INSTRUCTIONS TO RESPONDENTS

General instructions concerning this questionnaire:

A. Answer all the survey questions. Read each question and all of its responses carefully before selecting your answer.
B. Select only one response to each question. Mark your answer on the answer sheet only. Do not write on the questionnaire booklet.
C. If any question is not clear, or you have any difficulty, ask for help from the supervisor.

How to complete the Answer Sheet:

A. Use only a #2 pencil when filling out the answer sheet. Do not use ink.
B. Be sure that the item number on the answer sheet is the same as the number of the question you are answering.
C. Mark on the answer sheet the box that has the same letter or number as the response you selected from the questionnaire.
D. Fill in the box with a heavy mark, but do not go outside the lines of the box. Look at the examples below:

RIGHT   WRONG   WRONG

E. If you make a mistake, erase the mark completely before entering a new one.
F. Do not tear, fold, or bend the answer sheet.
G. Erase your name from the upper right-hand corner of the answer sheet.
H. Do not fill in your Social Security Account Number (SSAN) or make any mark on the answer sheet that would identify you in any way.
I. The number at the top of the answer sheet does not identify you. It is a means of controlling answer sheets only.

Questions 1 through 12 are reasons that may have influenced you to enlist. Using the scale below, indicate to what extent each of the reasons influenced your decision. For example, if "Career opportunities in the military looked better than in civilian life" was a strong influence for you to enlist, you would mark answer "A" for question 1 on your answer sheet.

		Strong Influence	Some Influence	No Influence
1.	Career opportunities in the military looked better than in civilian life.	A	B	C
2.	To become more mature and self-reliant.	A	B	C
3.	To learn a trade or skill that would be valuable in civilian life.	A	B	C
4	For travel, excitement and new experiences.	A	B	C
5.	To serve my country.	A	B	C
6.	I wanted to leave some personal problems behind me.	A	B	C
7.	I wanted an opportunity for advanced education and training.	A	B	C
8.	I wanted to qualify for the G.I. Bill.	A	B	C
9.	The over-all benefits-pay, room and board, medical care, and training	A	B	C
10.	To avoid the draft.	A	B	C
11.	I wanted my choice of service.	A	B	C
12.	To fulfill my military obligation at a time of my choice.	A	B	C

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13. Do you plan to stay in the service at the end of your current enlistment?

A No, I plan to leave the service
B I am undecided
C Yes, I plan to stay for a while longer
D Yes, I plan to make the service my career

14. What type of education have you had?

A Academic (College preparatory)
B General
C Business (Commercial)
D Technical (Vocational or Trade)
E Other than the above

15. Have you had formal training in a trade school?

A Yes
B No

16. Did you receive your draft notice before you enlisted?

A Yes
B No

17. In which Armed Service have you enlisted?

I have enlisted in the :

A Army
B Navy
C Marine Corps
D Air Force

18. If you tried to enlist in __another__ Service, in which Service did you
__first__ try to enlist?

A I did not try to enlist in another Service.
B I tried to enlist in the Army
C I tried to enlist in the Navy
D I tried to enlist in the Marine Corps
E I tried to enlist in the Air Force

19. Under which enlistment program did you enlist?

A General Enlistment (no specific program/commitment)
B Delayed Active Duty Enlistment
C In-Service Technical/Special Training Enlistment (for example,
nuclear. electronics, etc.)
D Choice of Geographical Area of Assignment.
E Choice of Occupational Area of Assignment.
F Commissioned or Warrant Officer Programs.

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20. What is the length of your enlistment?

    A 2 years
    B 3 years
    C 4 years
    D 6 years

21. If there had been no draft and you had no military obligation, do you think you would have enlisted?

    A Definitely yes
    B Probably yes
    C Probably no
    D Definitely no
    E I do not know

22. Did the possibility of being drafted influence you to enlist?

    A No, it had no effect on my decision to enlist.

    Yes:

    B STRONG influence for me to enlist
    C MODERATE influence for me to enlist
    D SLIGHT influence for me to enlist

23. Which ONE of the following MOST influenced your decision to enlist in your selected Service?

    A Recruiting publicity
    B Armed Services recruiters
    C Parent or relatives
    D Friend in the Service
    E School counselor

24. The Services tell you about themselves in many ways. Which one of those listed below had the most influence in your decision to enlist?

    A Radio   E Military publications
    B TV   F Posters
    C Newspapers   G Movies
    D Magazines

25. Were you working when you decided to enlist in the Armed Services?

    Yes, I was: No, I was:

    A Working full-time   D Student full-time
    B Working part-time   E Student part-time
    C Working part-time, student part-time   F Unemployed

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26, If you were working <u>full-time</u> before you decided to enlist, how much was your weekly pay?

    A Does not apply; I was not working full-time
    B Less than $25 per week
    C Between $25 and $50 per week
    D Between $50 and $75 per week
    E Between $75 and $100 per week
    F Between $100 and $125 per week
    G Between $125 and $150 per week
    H Between $150 and $175 per week
    I Between $175 and $200 per week
    J Between $200 and $225 per week
    K Between $225 and $250 per week
    L Over $250 per week

27. In what year were you born?

    A 1943 or earlier   H 1950
    B 1944   I 1951
    C 1945   J 1952
    D 1946   K 1953
    E 1947   L 1954
    F 1948   M 1955 or later
    G 194'

    Skip spaces 28-37 on your answer sheet and answer questions 38-47 in corresponding spaces.

---

38. In what month were you born?

    A January   G July
    B February   H August
    C March   I September
    D April   J October
    E May   K November
    F June   L December

39. On what day of the month were you born?

    A 1   J 10   S 19   1 28
    B 2   K 11   T 20   2 29
    C 3   L 12   U 21   3 30
    D 4   M 13   V 22   4 31
    E 5   N 14   W 23
    F 6   O 15   X 24
    G 7   P 16   Y 25
    H 8   Q 17   Z 26
    I 9   R 18   0 27

5

40 . What is the highest level of education you have completed?
(Select ONE answer only.)

A Did not complete Elementary (Grades 1 through 8) School
B Elementary School Graduate
C Completed 1 year of High School
D Completed 2 years of High School
E Completed 3 years of High School
F Completed 4 years of High School
G High School Graduate
H Completed GED credits for High School Graduate equivalency
I Completed 1 year of College
J Completed 2 years of College
K Completed 3 years of College
L Completed 4 years of College
M Completed GED credits for 2 years' College equivalency
N College degree (B.S., B.A., or equivalent, except LL. B.)
O Law Degree (LL. B.)
P Master's degree (M.S., M.A., or equivalent)
Q Doctor's degree (Ph. D., M.D., J.D., or equivalent)

41. What was your Selective Service classification just before you
enlisted?

A	I-A	J	II-C
B	I-AO	K	II-S
C	I-C	L	III-A
D	I-D	M	IV-A
E	I-O	N	IV-B
F	I-S	O	IV-C
G	I-W	P	IV-D
H	I-Y	Q	IV-F
I	II-A	R	V-A
		S	None

42. Are you married?

A Yes
B No

43. What is your race?

A Caucasian
B Negro
C Other

44. Which branch of the service is <u>highest in tradition</u>?

A Army
B Navy
C Marine Corps
D Air Force
E No difference

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45. Which branch of the service is best for providing a paid college education?

    A Army
    B Navy
    C Marine Corps
    D Air Force
    E No difference

46. Which branch of the service is best for pay?

    A Army
    B Navy
    C Marine Corps
    D Air Force
    E No difference

47. Which branch of the service offers the best chance to prove you are a man?

    A Army
    B Navy
    C Marine Corps
    D Air Force
    E No difference

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Appendix C

SAMPLE SITES FOR THE ARMED FORCES
ENTRANCE AND EXAMINATION STATIONS
(AFEES) SURVEY

Albany, New York
Baltimore, Maryland
Cleveland, Ohio
Fairmont, West Virginia
Philadelphia, Pennsylvania
Richmond, Virginia
Springfield, Massachusetts
Ashland, Kentucky
Charlotte, North Carolina
Jacksonville, Florida
Nashville, Tennessee
Albuquerque, New Mexico
Dallas, Texas
Chicago, Illinois
Denver, Colorado
Fargo, North Dakota
Kansas City, Missouri
Minneapolis, Minnesota
Omaha, Nebraska
Butte, Montana
Los Angeles, California
Phoenix, Arizona
Portland, Oregon
Spokane, Washington
Shreveport, Louisiana

Appendix D

INTERCORRELATIONS OF REASONS FOR ENLISTMENT ON TWO ARMY SAMPLES

Table D-1

Intercorrelations of Reasons for Enlistment on
an Army Sample for First Half of FY72

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1 Career opportunities in the military looked better than in civilian life.	--											
2 To become more mature and self reliant.	.30	--										
3 To learn a trade or skill that would be valuable in civilian life.	.41	.31	--									
4 For travel, excitement and new experiences.	.24	.32	.24	--								
5 To serve my country.	.34	.35	.26	.34	--							
6 I wanted to leave some personal problems behind me.	.05	.13	.08	.14	.04	--						
7 I wanted an opportunity for advanced training and education.	.44	.30	.54	.26	.31	.05	--					
8 I wanted to qualify for the G.I. Bill.	.01	.15	.06	.16	.10	.10	.15	--				
9 The over-all benefits: pay, room and board, medical care, and training.	.30	.26	.22	.29	.25	.12	.29	.31	--			
10 To avoid the draft.	-.23	-.14	-.16	-.11	-.14	.00	-.17	.11	-.04	--		
11 I wanted my choice of Service.	.18	.21	.21	.20	.28	.03	.22	.14	.21	.15	--	
12 To fulfill my military obligation at a time of my choice.	.09	.22	.14	.19	.28	.04	.13	.16	.17	.11	.37	--

Table D-2

Intercorrelations of Reasons for Enlistment
On an Army Sample for Second Half of FY72

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1 Career opportunities in the military looked better than in civilian life.	--											
2 To become more mature and self reliant.	.30	--										
3 To learn a trade or skill that would be valuable in civilian life.	.40	.29	--									
4 For travel, excitement and new experiences.	.22	.28	.22	--								
5 To serve my country.	.34	.35	.28	.31	--							
6 I wanted to leave some personal problems behind me.	.03	.11	.02	.11	-.01	--						
7 I wanted an opportunity for advanced training and education.	.41	.29	.50	.23	.31	.03	--					
8 I wanted to qualify for the G.I. Bill.	-.01	.12	.06	.15	.04	.10	.15	--				
9 The over-all benefits: pay, room and board, medical care, and training.	.29	.23	.23	.28	.18	.11	.29	.30	--			
10 To avoid the draft.	.22	-.16	-.15	-.07	-.12	.02	-.19	.10	-.08	--		
11 I wanted my choice of Service.	.24	.25	.20	.23	.32	.02	.21	.10	.21	.15	--	
12 To fulfill my military obligation at a time of my choice.	.13	.23	.15	.21	.32	.01	.15	.14	.17	.15	.40	--

Appendix E

TECHNICAL DISCUSSION OF THE CLUSTERING PROBLEM

STATEMENT OF THE PROBLEM

A statistical technique is required to partition the 12 reasons for enlistment into optimally homogeneous clusters (groups) on the basis of empirical measures of the relationships among the categories. This concept is stated in the context of similarity evaluation (Johnson, 27).

CONCEPTUALIZATION OF A SYSTEM FOR THE CLASSIFICATION OF REASONS FOR ENLISTMENT

The classification system is described as a series of hierarchically arranged clusters composed of the 12 initial reasons for enlistment. Each clustering at the lowest and weakest level (C_0) contains only one reason. Proceeding up the hierarchy, clusterings become stronger (more comprehensive), including the weaker clusters below, until the final, strongest (single) cluster (C_m) is established that contains all 12 of the reasons analyzed in the problem. It follows that the clusters (C_j) at the jth level contain reasons with an endorsement that is less related (i.e., correlated to a lesser extent) than the reasons in clusters C_{j-1} one level below.

The clustering hierarchy of reasons for enlistment can be quantified if relationships between the endorsement of the 12 individual reasons can be obtained. Correlation coefficients are used as measures of these relationships, of the extent of endorsement of each pair of reasons.

ALGORITHMS

The diameter method and connectedness method of hierarchical clustering offer a solution to the problem as stated.

Given n reasons,[1] and the relationships between the endorsement of each reason, and the endorsement of each of the other reasons, a specific hierarchy can be established by the hierarchical clustering scheme (HCS) devised by Johnson (27). The steps for doing this (taken from Johnson, 27, p. 246) are as follows:

Step 1. Clustering C_0, with value 0, is the weak clustering.

Step 2. Assume we are given the clustering C_{j-1} with the correlation matrix between each reason and every other. Let $_j$ be the largest correlation coefficient entry in the matrix. Merge the pair of reasons and/or clusters with correlation coefficient $_j$, to create C_j, or value $_j$.

[1] In this research, n = 12.

Step 3. We may create a new, reduced correlation matrix, treating the new clusters as objects, in an unambiguous manner. That is, if x and y are two objects (possibly clusters) at level C_{j-1}, and if $r(x,y) = j$ (so that x and y become clustered in C_j), and if z is any other object or cluster at level C_{j-1}, then $r(x,z) = r(y,z)$.[2]

Step 4. Now, repeat Steps 2 and 3 until we finally obtain the strong (i.e., all inclusive) clustering—we are then finished.

MATHEMATICAL FORMULATION

Hubert([32]) has presented a mathematical formulation of hierarchical clustering in terms of lattice theory. A summarization of his concepts follows.[3]

The following terminology and notation are introduced to make the discussion concise and less ambiguous. To this end, let S be a set of n objects one wishes to sort into meaningful classes. The elements of S can be represented by the n integers 1,2,...,n without loss of generality, so that $S = \{1,2,...,n\}$.

Assume the existence of a measure r_{ij} giving the extent of relationship of objects i and j. Thus, if r_{ij} is large, the interpretation is that objects i and j are highly related. The r_{ij} values can be arranged in an n-by-n matrix called the correlation matrix.

Before continuing, examples will be given to illustrate the concepts of the *partitions* of a set and *refinements* of the partitions. Thus, let S be the set $S = \{1,2,3,4,5,6\}$ and form a new set in the following way. Place objects 1 and 2 together in one set, objects 3,4, and 5 in another set, and object 6 in another set. The resulting set can be denoted l_1 and is:

$$l_1 = \{ \{1,2\}, \{3,4,5\}, \{6\} \}$$

The elements of the set l_1 are sets and are termed the *blocks* of the *partition* l_1. The number of partitions increases rapidly as n increases. For example, if n = 3, there are 5 partitions, but for n = 6, there are 203 partitions.

Consider now another partition of S:

$$l_2 = \{ \{1,2\}, \{3\}, \{4,5\}, \{6\} \}$$

Comparing l_1 and l_2, it is seen that the blocks of l_2 are subsets of the blocks of l_1. In this case, partition l_2 is said to be a *refinement* of partition l_1. We can construct a diagram connecting some of the possible partitions of a set by using the refinement relation.

For example, let $S = \{1,2,3\}$, then the four possible partitions of S are as follows:

$$\{1,2,3\}$$
$$\{ \{1,2\}, \{3\} \}$$
$$\{ \{1,3\}, \{2\} \}$$
$$\{ \{2,3\}, \{1\} \}$$
$$\{ \{1\}, \{2\}, \{3\} \}$$

---

[2] In the event that $r(x,z) \neq r(y,z)$, a convention may be employed. In the diameter method, Johnson ([27]) uses the following $r(x,y),z) = $ min. $(r(x,z),r(y,z))$. In the connectedness method, $r(x,y)z) = $ max. $(r(x,z),r(y,z))$.

[3] Summarized by E.H. Kingsley, mathematician, HumRRO, Alexandria, Va.

The results, using the refinement relation are shown in the diagram below:

$$\{1,2,3\}$$

$$\{\{1,2\}, \{3\}\} \qquad \{\{1,3\}, \{2\}\} \qquad \{\{2,3\}, \{1\}\}$$

$$\{\{1\}, \{2\}, \{3\}\}$$
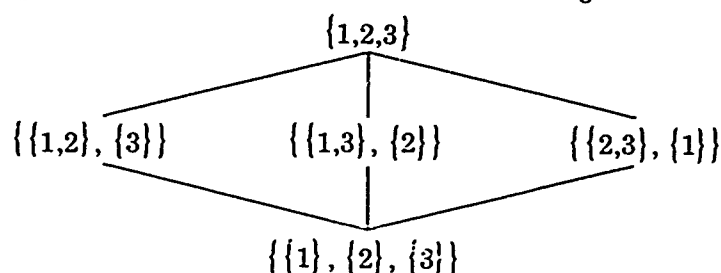
The partitions connected by lines in this diagram connect, reading upwards, partitions that are refinements of the partitions above them. The diagram is a pictorial representation of a *lattice*.

For the set S, let L designate the set of all the possible partitions of S. A *chain* in L is an ordered set of partitions, denoted by
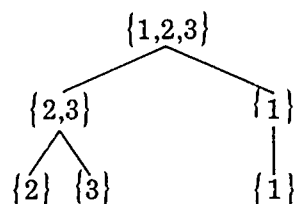
$$C = \langle C_0, C_1, ..., C_p \rangle$$

with the property that C_j is a refinement of C_{j+1}, where $j = 0,1,...,p-1$. In the above example, the three possible chains are:

$$\langle \{\{1\}, \{2\}, \{3\}\} \ , \ \{\{1,2\}, \{3\}\} \ , \{1,2,3\}\} \ \rangle$$
$$\langle \{\{1\}, \{2\}, \{3\}\} \ , \ \{\{1,3\}, \{2\}\} \ , \{1,2,3\}\} \ \rangle$$
$$\langle \{\{1\}, \{2\}, \{3\}\} \ , \ \{\{2,3\}, \{1\}\} \ , \{1,2,3\}\} \ \rangle$$

The above three chains have the following three graphic representations, respectively:

$$\{1,2,3\}$$

$$\{1,2\} \qquad \{3\}$$

$$\{1\} \ \{2\} \qquad \{3\}$$

$$\{1,2,3\}$$

$$\{1,3\} \qquad \{2\}$$

$$\{1\} \ \{3\} \qquad \{2\}$$

$$\{1,2,3\}$$

$$\{2,3\} \qquad \{1\}$$

$$\{2\} \ \{3\} \qquad \{1\}$$
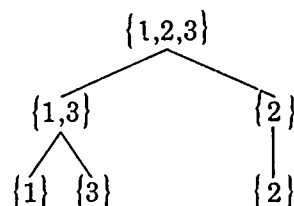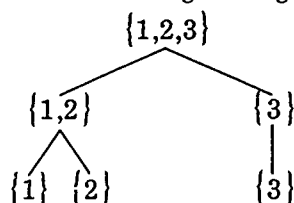
The above three diagrams illustrate the definition of a hierarchical clustering of the set $S = \{1,2,3,\}$. In lattice theoretical terms, a hierarchy is thus defined to be a chain.

The terminology and concepts of lattice theory thus permit a precise definition to be given for a hierarchy. The theory also permits the explication of properties of hierarchies to be given in set theoretic terms. Thus, intuitive notions about hierarchies can be formulated in set theoretical terms and their implications studied.

Appendix F

FIRST-ORDER PREDICTOR/CRITERION INTERCORRELATIONS ON THE DISPOSITION OF APPLICANTS, BY SERVICE

Variable	Army (N = 9445)	Navy (N = 7171)	Marine Corps (N = 3151)	Air Force (N = 6111)
Reasons for Enlistment				
Military career opportunities	-.08	.01	-.08	.03
Maturity	-.04	-.03	.05	-.07
Trade/skill	-.05	.05	-.03	.03
Travel/excitement	-.02	.05	-.03	-.07
Patriotism	-.06	-.02	.03	-.07
Leave personal problems	-.03	-.09	.00	-.06
Opportunity for advanced education	-.06	.02	-.05	.05
G.I. Bill	-.01	-.07	.01	-.06
Personnel benefits	-.01	.00	-.01	.02
Avoid the draft	.01	-.04	-.01	.02
Choice of Service	-.05	.09	.09	.10
Time of choice	.01	-.02	.06	-.01
Demographic Characteristics				
Trade school	-.04	-.06	-.03	-.05
Received draft notice prior to enlistment	-.04	-.08	-.04	-.04
Age	-.06	-.09	-.11	-.02
Educational level	.11	.14	.04	.09
Marital status	-.01	-.08	-.05	-.01
Race	.11	.10	.08	.13
AFQT mental category	-.07	-.13	-.08	-.12
Employed at time of enlistment	-.01	.01	.01	.03
High School Program				
Academic	.06	.08	.03	.07
Business	-.05	-.07	-.01	-.02
Technical	-.01	-.01	-.01	-.03
Other	.00	-.10	-.01	-.03
Persons Most Influential				
Recruiting publicity	.02	.00	.03	-.04
Recruiter	.01	-.08	-.01	-.02
Parent or relatives	.00	.06	-.03	.03
Friend in the Service	-.03	.04	.01	.04
School counselor	-.04	-.02	.01	.00
Media Most Influential				
Radio	-.01	-.03	-.05	-.04
Television	.02	-.02	-.04	-.01
Newspapers	.01	-.04	-.01	-.02
Magazines	.01	.00	-.03	.02
Military publications	.00	.03	.02	.05
Posters	-.06	.01	.04	-.01
Movies	-.01	.03	.05	-.03

Appendix G

MODELS DEVELOPED TO PREDICT
THE ENLISTMENT DISPOSITION OF INITIAL APPLICANTS
TO THE FOUR SERVICES

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Model Developed by AID
to Predict the Enlistment Disposition
of Initial Applicants to the U.S. Army

Figure G-1

N = Sample size
p = Percentage of Army applicants
   enlisted into the Army
* = Designates final cell

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Model Developed by AID to Predict the Enlistment Disposition of Initial Applicants to the U.S. Navy

Figure G-2

Model Developed by AID
to Predict the Enlistment Disposition
of Initial Applicants to the U.S. Marine Corps

N - Sample size
p Percentage of USMC applicants
    enlisted into the Marine Corps
* Designates final cell

Figure G-3

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Model Developed by AID
to Predict the Enlistment Disposition
of Initial Applicants to the U.S. Air Force

N = Sample size
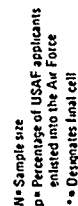p = Percentage of USAF applicants enlisted into the Air Force
* = Designates final cell

Root: N=6111, p=85.9

MG IV: N=631, p=72.1
MG I, II or III: N=5480, p=87.5

17 or 21 yrs: N=129*, p=58.1
18-20 yrs: N=502, p=75.7
17 or 22 yrs: N=1071, p=79.6
18-21 yrs: N=4409, p=89.5

Other: N=247, p=70.9
Caucasian: N=255, p=80.4
Non HS Grad: N=301, p=68.1
HS Grad or above: N=770, p=84.0
Other: N=851, p=82.4
Caucasian: N=3558, p=91.2

Mil. Pub., Radio, Papers, Movies, None: N=146*, p=65.8
TV, Posters, Mags: N=101*, p=78.2
MATURITY Strong No Inf.: N=149*, p=74.5
MATURITY Some Inf.: N=106*, p=88.7
Recruit Pub., Family: N=142*, p=61.3
Recruit, Friend, Counselor, None: N=159*, p=74.2
CHOICE SERVICE No Inf.: N=139*, p=74.8
CHOICE SERVICE Strong Some Inf.: N=631, p=86.1
PATRIOTISM Strong Inf.: N=273, p=75.1
PATRIOTISM Some No Inf.: N=578, p=85.8
ADV EDUC No Inf.: N=203*, p=80.8
ADV EDUC Strong Some Inf.: N=3355, p=91.8

TRADE/SKILL Strong No Inf.: N=431, p=83.3
TRADE/SKILL Some Inf.: N=200, p=92.0
MATURITY Strong Inf.: N=165*, p=69.7
MATURITY Some No Inf.: N=106*, p=83.3
Recruiter, Recruit Pub., None: N=254, p=81.1
Counselor, Friend, Family: N=324, p=89.5
MATURITY Strong Inf.: N=1254, p=88.7
MATURITY Some No Inf.: N=2101, p=93.7

Movies, Radio, Papers, Posters, None: N=118*, p=72.9
Mil. Pub., Mags, TV: N=313, p=87.2
CHOICE SERVICE Some No Inf.: N=118*, p=73.7
CHOICE SERVICE Strong Inf.: N=136*, p=87.5
CHOICE SERVICE Some No Inf.: N=380, p=83.2
CHOICE SERVICE Strong Inf.: N=874, p=91.1
CAREER OPP No Inf.: N=247, p=87.4
CAREER OPP Strong Some Inf.: N=1854, p=94.5

Counselor, Recruiter, Recruit Pub.: N=168*, p=82.7
Family, Friend, None: N=145*, p=92.4
PATRIOTISM Strong Inf.: N=154*, p=77.3
PATRIOTISM Some No Inf.: N=226, p=87.2
PT Employ, Unemploy.: N=272, p=86.4
Employ or Unemploy.-Stud., FT Employ: N=602, p=93.2
Received Draft Notice: N=169*, p=87.6
No Draft Notice: N=1685, p=95.2

PATRIOTISM Strong Inf.: N=153*, p=81.7
PATRIOTISM Some No Inf.: N=119*, p=92.4
Papers, TV, None: N=179*, p=88.3
Movies, Posters, Mags, Radio, Mil. Pub.: N=423, p=95.3
TRAVEL/EXCITE Strong Inf.: N=540, p=92.8
TRAVEL/EXCITE Some No Inf.: N=1145, p=96.3

Posters, Mags, Radio, Papers, None: N=168*, p=87.5
Mil. Pub., TV, Movies: N=372, p=95.2
Movies, Mags, Papers: N=338, p=94.4
Mil. Pub., TV, Radio, Posters, None: N=807, p=97.1

Figure C-4